Condor Environmental, LLC

SCHEDULE OF EXHIBITS

Exhibit A	Amended Articles of Incorporation
Exhibit B1	Pump Station and Force Main Agreement by and among Applicant, Acadia LLC, and MSS
Exhibit B2	DHEC approval to place the pump station and force main for the Proposed Acadia Service Area into operation
Exhibit B3	Plat of the Proposed Acadia Service Area
Exhibit B4	Technical specifications for the pump station and force main for the Proposed Acadia Service Area certified to be in accordance with good engineering practices by Joe M. Barron, PE
Exhibit B5	Construction Permit from DHEC approving the plans and specifications for the Pump Station and Force Main for the Proposed Acadia Service Area
Exhibit C1	Pump Station and Force Main Agreement by and among the Applicant, Allison's Meadow POA, Lennar, and MSS
Exhibit C2	Fax from DHEC illustrating DHEC approved the pump station and force main the Proposed Allison's Meadow Service Area into operation
Exhibit C3	Quit Claim Deed for the pump station and force main in the Proposed Allison's Meadow Service Area
Exhibit C4	Plat of the Proposed Allison's Meadow Service Area
Exhibit C5	Technical specifications for the pump station and force main for the Proposed Allison's Meadow Service Area certified to be in accordance with good engineering practices by Rodney E. Gray, PE
Exhibit C6	Construction Permit from DHEC approving the plans and specifications for the Pump Station and Force Main for the Proposed Allison's Meadow Service Area
Exhibit C7	Statement by Steven A. Robertson, PE, certifying the pump station and force main were built and installed according to approved plans and specifications
Exhibit C8	Letter from Western Carolina Regional Sewer Authority that it has sufficient capacity to treat the wastewater flow from the Proposed Allison's Meadow Service Area

Exhibit C9	Letter from MSS finding the sewer lines for the Proposed Allison's Meadow Service Area acceptable according to its standards
Exhibit D1	Pump Station and Force Main Agreement by and among Cobblestone Cove HOA, Condor Environmental, Inc., the City of Mauldin, and Landcraft
Exhibit D2	DHEC approval to place the pump station and force main for the Proposed Cobblestone Cove Service Area into operation
Exhibit D3	Quit Claim Deed for the pump station and force main in the Proposed Cobblestone Cove Service Area
Exhibit D4	Letter from the City of Mauldin refusing to accept ownership and operation of the lift station
Exhibit D5	Plat of the Proposed Cobblestone Cove Service Area
Exhibit D6	Technical specifications for the pump station and force main for the Proposed Cobblestone Cove Service Area certified to be in accordance with good engineering practices by Harold L. Morris, PE
Exhibit D7	Construction Permit from DHEC approving the plans and specifications for the Pump Station and Force Main for the Proposed Cobblestone Cove Service Area
Exhibit D8	Statement by John L. Chambers, PE, certifying the pump station and force main were built and installed according to approved plans and specifications
Exhibit D9	Letter from Western Carolina Regional Sewer Authority that it has sufficient capacity to treat the wastewater flow from the Proposed Cobblestone Cove Service Area
Exhibit D10	Letter from the City of Mauldin finding the sewer lines for the Proposed Cobblestone Cove Service Area acceptable according to its standards
Exhibit E1	Pump Station and Force Main Agreement by and among Coleman Shoals HOA, Coleman Grove, LLC, Condor Environmental, Inc., and MSS
Exhibit E2	Assignment of Pump Station and Force Main Agreement from Condor Environmental, Inc. to Applicant
Exhibit E3	DHEC approval to place the pump station and force main for the Proposed Coleman Shoals Service Area into operation
Exhibit E4	Quit Claim Deed for the pump station and force main in the Proposed Coleman Shoals Service Area

Exhibit E5	Plat of the Proposed Coleman Shoals Service Area
Exhibit E6	Sanitary Sewer Design Calculations for the pump station and force main for the Proposed Coleman Shoals Service Area certified to be in accordance with good engineering practices by John Michael Maddock, PE
Exhibit E7	Construction Permit from DHEC approving the plans and specifications for the Pump Station and Force Main for the Proposed Coleman Shoals Service Area
Exhibit E8	Statement by Allan E. Epps, PE, certifying the pump station and force main were built and installed according to approved plans and specifications
Exhibit E9	Letter from Western Carolina Regional Sewer Authority that it has sufficient capacity to treat the wastewater flow from the Proposed Coleman Shoals Service Area
Exhibit E10	Letter from MSS finding the sewer lines for the Proposed Coleman Shoals Service Area acceptable according to its standards
Exhibit F1	Inspection and Maintenance Agreement by and between Applicant and Terry Creek Company
Exhibit F2	DHEC approval to place the pump station and force main for the Proposed Country Place Service Area into operation
Exhibit F3	Escrow and Operation Agreement by and between Terry Creek Company and DHEC
Exhibit F4	Amendment to the Escrow and Operation Agreement by and between Terry Creek Company and DHEC
Exhibit F5	Plat of the Proposed Country Place Service Area
Exhibit F6	Sanitary Sewer Design Plans for the pump station and force main for the Proposed Country Place Service Area certified to be in accordance with good engineering practices by John C. Darrohn, PE
Exhibit F7	Construction Permit from DHEC approving the plans and specifications for the Pump Station and Force Main for the Proposed Country Place Service Area
Exhibit G1	Wastewater Collection System Agreement by and between the Applicant and Fairview Investments, LLC
Exhibit G2	DHEC approval to place the pump station and force main for the Proposed Country Place Service Area into operation

Exhibit G3	Letter from Western Carolina Regional Sewer Authority that it has sufficient capacity to treat the wastewater flow from the Proposed Fairview Chase Service Area
Exhibit G4	Plat of the Proposed Fairview Chase Service Area
Exhibit G5	Design Calculations for the pump station and force main for the Proposed Fairview Chase Service Area certified to be in accordance with good engineering practices by Steven A. Robertson, PE
Exhibit G6	Construction Permit from DHEC approving the plans and specifications for the Pump Station and Force Main for the Proposed Fairview Chase Service Area
Exhibit G7	Statement by Steven A. Robertson, PE, certifying the pump station and force main were built and installed according to approved plans and specifications
Exhibit G8	Letter from MSS finding the sewer lines for the Proposed Fairview Chase Service Area acceptable according to its standards
Exhibit H1	Pump Station and Force Main Agreement by and among the Applicant, Stathos, and MSS
Exhibit H2	DHEC approval to place the pump station and force main for the Proposed GPS Center Service Area into operation
Exhibit H3	Quit Claim Deed for the pump station and force main in the Proposed GPS Center Service Area
Exhibit H4	Plat of Proposed GPS Center Service Area
Exhibit H5	Technical specifications for the pump station and force main for the Proposed GPS Center Service Area certified to be in accordance with good engineering practices by Gary Alan Johnson, PE
Exhibit H6	Construction Permit from DHEC approving the plans and specifications for the Pump Station and Force Main for the Proposed GPS Center Service Area
Exhibit H7	Statement by Alan Johnson, PE, certifying the pump station and force main were built and installed according to approved plans and specifications
Exhibit H8	Letter from Western Carolina Regional Sewer Authority that it has sufficient capacity to treat the wastewater flow from the Proposed GPS Center Service Area
Exhibit I1	Pump Station and Force Main Agreement by and among the Applicant, Five Forks Properties, LLC, and MSS

Exhibit I2	DHEC approval to place the pump station and force main for the Proposed Highgrove Service Area into operation
Exhibit I3	Quit Claim Deed for the pump station and force main in the Proposed Highgrove Service Area
Exhibit I4	Plat of the Proposed Highgrove Service Area
Exhibit I5	Calculations and Specifications for the pump station and force main for the Proposed Highgrove Service Area certified to be in accordance with good engineering practices by James R. Freeland, PE
Exhibit I6	Construction Permit from DHEC approving the plans and specifications for the Pump Station and Force Main for the Proposed Highgrove Service Area
Exhibit I7	Statement by D. Kevin Tumblin, PE, certifying the pump station and force main were built and installed according to approved plans and specifications
Exhibit I8	Letter from Western Carolina Regional Sewer Authority that it has sufficient capacity to treat the wastewater flow from the Proposed Highgrove Service Area
Exhibit I9	Letter from MSS finding the sewer lines for the Proposed Highgrove Service Area acceptable according to its standards
Exhibit J1	Inspection and Maintenance Agreement by and between the Applicant and Pinckney Construction, Inc
Exhibit J2	Escrow and Operation Agreement by and between Pinckney Construction, Inc. and DHEC
Exhibit J3	Plat of the Proposed Mountain Creek Service Area
Exhibit J4	Construction Permit from DHEC approving the plans and specifications for the onsite wastewater system for the Proposed Mountain Creek Service Area
Exhibit J5	Statement by D. Kevin Tumblin, PE, certifying the system was built and installed according to approved plans and specifications
Exhibit K1	Pump Station and Force Main Agreement by and among Five Forks HOA, Plantation Point of Greenville, LLC, Condor Environmental, Inc. and MSS
Exhibit K2	Assignment of Pump Station and Force Main Agreement from Condor Environmental, Inc. to the Applicant
Exhibit K3	DHEC approval to place the pump station and force main for the Proposed Five Forks Service Area into operation

Exhibit K4	Quit Claim Deed for the pump station and force main in the Proposed Five Forks Service Area
Exhibit K5	Corrective Quit Claim Deed for the pump station and force main in the Proposed Five Forks Service Area
Exhibit K6	Corrective Quit Claim Deed for the pump station and force main in the Proposed Five Forks Service Area
Exhibit K7	Letter from MSS declining to accept ownership and maintenance responsibility for the pump station for the Proposed Five Forks Service Area
Exhibit K8	Plat of the Proposed Five Forks Service Area
Exhibit K9	Technical specifications for the pump station and force main for the Proposed Five Forks Service Area certified to be in accordance with good engineering practices by Steven A. Robertson, PE
Exhibit K10	Construction Permit from DHEC approving the plans and specifications for the Pump Station and Force Main for the Proposed Five Forks Service Area
Exhibit K11	Statement by Steven A. Robertson, PE, certifying the pump station and force main were built and installed according to approved plans and specifications
Exhibit L1	Pump Station and Force Main Agreement by and among Hipps Road Ventures, LLC, the Applicant, and MSS
Exhibit L2	DHEC approval to place the pump station and force main into the Proposed Victoria Park Service Area into operation
Exhibit L3	Quit Claim Deed for the pump station and force main in the Proposed Victoria Park Service Area
Exhibit L4	Plat of the Proposed Victoria Park Service Area
Exhibit L5	Calculations for the pump station and force main for the Proposed Victoria Park Service Area certified to be in accordance with good engineering practices by Steven A. Robertson, PE
Exhibit L6	Construction Permit from DHEC approving the plans and specifications for the Pump Station and Force Main for the Proposed Victoria Park Service Area
Exhibit L7	Statement by Steven A. Robertson, PE, certifying the pump station and force main were built and installed according to approved plans and specifications

Exhibit L8	Letter from Western Carolina Regional Sewer Authority that it has sufficient capacity to treat the wastewater flow from the Proposed Victoria Park Service Area
Exhibit L9	Letter from MSS finding the sewer lines acceptable according to its standards
Exhibit M1	Pump Station and Force Main Agreement by and among WWW.White Horse Rd, LLC, Hilton Resources, LLC, White Horse POA, the Applicant, and Berea Public Service District
Exhibit M2	DHEC approval to place the pump station and force main for the Proposed White Horse Service Area into operation
Exhibit M3	Quit Claim Deed for the pump station and force main in the Proposed White Horse Service Area
Exhibit M4	Plat of the Proposed White Horse Service Area
Exhibit M5	Technical specifications for the pump station and force main for the Proposed White Horse Service Area certified to be in accordance with good engineering practices by James D. McCutcheon, PE
Exhibit M6	Construction Permit from DHEC approving the plans and specifications for the Pump Station and Force Main for the Proposed White Horse Service Area
Exhibit M7	Statement by James D. McCutcheon, PE, certifying the pump station and force main were built and installed according to approved plans and specifications
Exhibit M8	Letter from Western Carolina Regional Sewer Authority that it has sufficient capacity to treat the wastewater flow from the Proposed White Horse Service Area
Exhibit M9	Letter from the Berea Public Service District agreeing to own and maintain the sewer lines for the Proposed White Horse Service Area
Exhibit N1	Pump Station and Force Main Agreement by and among Thornblade Crossing HOA, Condor, MSS, and Poinsett Development, LLC
Exhibit N2	DHEC approval to place the pump station and force main for the Proposed Thornblade Crossing Service Area into operation
Exhibit N3	Plat of the Proposed Thornblade Crossing Service Area
Exhibit N4	Technical specifications for the pump station and force main for the Proposed Thornblade Service Area

Exhibit N5	Construction Permit from DHEC approving the plans and specifications for the Pump Station and Force Main for the Proposed Thornblade Crossing Service Area
Exhibit O	Schedule of Rates as Identified in the Agreements
Exhibit P	Financial Statement
Exhibit Q	Depreciation Schedule
Exhibit R	Proforma Income and Expense Statement
Exhibit S	Customer Bill Form

Exhibit A

CERTIFIED TO BE A TRUE AND CORRECT COPY
AS TAKEN FROM AND COMPARED WITH THE
ORIGINAL ON FILE IN THIS OFFICE

JUL 26 2005

SECRETARY OF STATE OF SOUTH CAROLINA

STATE OF SOUTH CAROLINA
SECRETARY OF STATE

AMENDED ARTICLES OF ORGANIZATION
LIMITED LIABILITY COMPANY

TYPE OR PRINT CLEARLY IN BLACK INK

The Limited Liability Company amends its articles of organization in accordance with Section 33-44-204 of the 1976 South Carolina Code of Laws, as amended.

1. The name of the Limited Liability Company is Condor Environmental O&M, LLC.

2. The date the articles of organization were filed is September 8, 2003.

3. The articles of organization are amended in the following respects, of which all amended provisions may lawfully be included in the articles of organization.

   The name of the limited liability company is changed from Condor Environmental O&M, LLC to

   Condor Environmental, LLC

4. Please attach additional amendments if space is needed.

Date July 25, 2005

Signature

SAMUEL D. WEAVER, Member
EUGENE C. McCALL, JR., Member

Name/ Capacity

FILING INSTRUCTIONS

1. If management of the Limited Liability Company is vested in managers, a manager shall execute these amended articles of organization. If management of the Limited Liability Company is reserved to the members, a member shall execute these amended articles of organization. Specify whether a member or manager is executing these amended articles of organization.

2. File two copies of this form, the original and either a duplicate original or a conformed copy.

3. This form must be accompanied by the filing fee of $110.00, payable to the Secretary of State.

Return to: Secretary of State
PO Box 11350
Columbia SC 29211

THE FILING OF THIS DOCUMENT DOES NOT, IN AND OF ITSELF, PROVIDE AN EXCLUSIVE RIGHT TO USE THIS CORPORATE NAME ON OR IN CONNECTION WITH ANY PRODUCT OR SERVICE. USE OF A NAME AS A TRADEMARK OR SERVICE MARK WILL REQUIRE FURTHER CLEARANCE AND REGISTRATION AND BE AFFECTED BY PRIOR USE OF THE MARK. FOR MORE INFORMATION, CONTACT THE TRADEMARKS DIVISION OF THE SECRETARY OF STATE'S OFFICE AT (803) 734-1728.

Form Revised by South Carolina
Secretary of State, January 2000

050727-0002 **FILED: 07/26/2005**
CONDOR ENVIRONMENTAL, LLC
Filing Fee: $110.00 ORIG

Mark Hammond South Carolina Secretary of State

Exhibit B 1

STATE OF SOUTH CAROLINA)
)
COUNTY OF GREENVILLE)

PUMP STATION AND FORCE MAIN AGREEMENT

THIS PUMP STATION AND FORCE MAIN AGREEMENT is made and entered into on this 19th day of October, 2005, by and among ACADIA, LLC, a South Carolina Limited Liability Company ("Acadia"); CONDOR ENVIRONMENTAL, LLC, a South Carolina Limited Liability Company ("Condor"); and METROPOLITAN SEWER SUBDISTRICT ("Metropolitan"), a South Carolina Special Purpose District.

WITNESSETH:

WHEREAS, Acadia is planning to develop a mixed use, residential and commercial development near the junction of I185 Southern Connector and the connector to Hwy 153 in Greenville County, South Carolina, on the property which is described on Exhibit A, hereto attached and made a part hereof (the "Premises"); and

WHEREAS, Acadia anticipates that one or more property owner associations will become the governing association for the various developments on the Premises; and

WHEREAS, the development plan for the Premises provides for an estimated seven hundred homes and with additional commercial property which will be served by the Pump Station and Force Main as hereinafter defined; and

WHEREAS, sanitary sewer collection service will be provided to the Premises by Metropolitan upon approval by Metropolitan and dedication of the system and its gravity lines to Metropolitan; and

WHEREAS, due to the topography of the land on which Acadia is being developed, the sewer system shall include a Pump Station and Force Main lines that are to be designed and installed on the Premises pursuant to the current policies of Metropolitan; and

WHEREAS, with Metropolitan's consent Condor has agreed to assume the ownership, operation and maintenance responsibility for the Pump Station and Force Main to be located on the Premises that will be deeded over to Condor in accordance with the terms and provisions of this Agreement;

NOW, THEREFORE, for and in consideration of the foregoing premises, and of the mutual covenants of the parties herein set forth, the parties hereto hereby agree as follows:

1. COMPLETETION AND CONVEYANCE OF PUMP STATION AND FORCE MAIN. Acadia agrees to design and complete the construction of the Pump Station and Force Main in accordance with the plans and specifications for the Pump Station and Force Main prepared by The Fletcher Group (the "Engineer") that meet the requirements of Condor and Metropolitan Sewer Sub District and to cause the Pump Station and Force Main, and which includes an extra pump and a standby electric generator which becomes part of the Pump Station, to be approved to operate by the Department of Health and Environmental Control of the State of South Carolina. Acadia agrees that at such time as the actions described in the foregoing sentence shall have been completed, Acadia shall transfer and convey the Pump Station and associated real property and Force Main to Condor along with all necessary and appropriate easements. At the time of said transfer and conveyance, Acadia shall also assign to Condor all warranties which shall have been made to Acadia by the Contractor and the Engineer in regard to the Pump Station and Force Main and the plans and specifications for the Pump Station and Force Main. Acadia will upgrade the Pump Station as needed to complete the build out of the proposed development in Exhibit A.

Condor agrees that, during construction and prior to the transfer and conveyance of the Pump Station and Force Main to it, that it will conduct such inspections of the Pump Station and Force Main as Condor shall deem necessary to satisfy itself as to the condition of the Pump Station and Force Main and Acadia agrees to pay Condor's reasonable fees and costs of such inspections, not to exceed $10,000. Acadia additionally agrees to pay Condor's reasonable attorney fees associated with this Agreement, construction of the Pump Station and Force Main, and transfer of the Pump Station and Force Main to Condor, not to exceed $5,000.

2. OPERATION OF PUMP STATION AND FORCE MAIN. Condor agrees to accept the transfer and conveyance to it by Acadia of the Pump Station and Force Main and thereafter to operate, repair, maintain and replace the same in accordance with the terms and provisions of this agreement.

Condor shall operate and maintain the Pump Station and Force Main so that all houses and commercial property served by the Pump Station and Force Main shall receive continuous adequate sanitary sewer service without interruption. The repair, maintenance and replacement responsibilities of Condor under this Agreement shall include the replacement of all parts of the Pump Station and Force Main which shall become worn out or obsolete and the making of all capital repairs and replacements as shall be necessary in order for Condor to carry out its obligations under this Agreement without interruption.

It is anticipated that the wastewater collected from the Premises and delivered to the Pump Station and Force Mains consists only of wastewater of typical residential/commercial strength waste. If that is not the case, Condor may take necessary and appropriate action, in accordance with reasonable wastewater industry standards, if the contaminant level, waste concentration or composition of this wastewater exceeds the level described herein and charge separately and in addition to the normal Monthly Fee for such action.

Condor shall operate and maintain the Pump Station and Force Main so that the same will at all times comply with and fulfill all governmental laws, rules and regulations that shall be applicable to the operation and maintenance of the Pump Station and Force Main. Without limiting the generality of the forgoing, Condor shall operate and maintain the Pump Station and Force Main in accordance with all rules and regulations which shall be promulgated at any time, and from time to time, by Metropolitan for privately owned and maintained sanitary sewer Pump Stations and Force Main which are part of the sewage collection system operated by Metropolitan. In addition, Condor shall comply with all policies and requirements of South Carolina Public Service Commission or other appropriate governmental agencies which may be applicable to the Pump Station and Force Main.

3. PAYMENT BY ACADIA. Acadia hereby agrees that in consideration for the performance by Condor of its duties and obligations under this Agreement, Acadia shall pay to Condor at the amount of Nine Hundred Ten Dollars ($910.00) (the "Monthly Fee") per month beginning at the initial operation of the Pump Station to service Phase I of the residential construction. This initial Monthly Fee shall include services for the first seventy (70) houses that are connected to and serviced by the Pump Station and Force Main.

At the initiation of wastewater flow from the seventy-first house to be served and thereafter for each additional house served within Phase I, the Monthly Fee shall be the $910.00 base, plus $10.00 per each additional house (the "Additional House Fee") in Phase I.

At the beginning of Phase II of residential construction, and for each additional Phase through Phase V, the Monthly Fee shall be increased by the amount of Four Hundred Dollars ($400.00) at the initiation of service to each new phase. These additional Monthly Fee amounts shall include services for the first forty (40) houses that are connected to and serviced by the Pump Station and Force Main within each new Phase. At the initiation of wastewater flow from the forty-first house to be served and thereafter for each additional house served within the respective Phase, the additional Monthly Fee for each Phase shall be the $400.00 base, plus $10.00 per each additional house (the "Additional House Fee").

At the beginning of the first service for the Commercial Phase, for each commercial building served, the Monthly Fee shall be increased by a minimum of $10.00 per each commercial building served or $2.50/100 gallons of design wastewater loading whichever is greater (the "Commercial Building Fee").

Acadia shall also establish either a letter of credit or a cash escrow account with an appropriate escrow agent (the "Escrow Agent"), at the option of Acadia, the amount of six (6) times the Monthly Fee, to be held in trust to guarantee the payment by Acadia of the Monthly Fee to Condor. The escrow amount shall be recalculated and replenished annually to an amount equal to six (6) times the then current Monthly Fee.

Acadia shall pay the Monthly Fee to Condor on or before the tenth day of each calendar month by means of a check made payable to Condor and mailed or otherwise delivered to the

address herein below provided. In the event that Acadia shall at any time fail to pay to Condor the Monthly Fee within thirty (30) days of the due date, Condor shall have the right to draw the Monthly Fee plus ten percent (10%) of the Monthly Fee as a delinquency charge from the escrow account upon presentation of such unpaid invoice and an accompanying notarized statement that payment plus penalty are due to the Escrow Agent. The Escrow Agent shall then pay Condor from its escrow account the payment and penalty due. Condor shall at all times be responsible for the continued performance of its duties and obligations under this Agreement.

On an annual basis, with thirty (30) days prior notice to Acadia, Condor shall have the right to increase the amount of the Monthly Fee, the Additional House Fee and the Commercial Building Fee at any time, in order to compensate Condor for any reasonable increase in the cost and expense to Condor of performing its responsibilities under this Agreement, and further provided that the increase in the resulting Monthly Fee shall not be increased by more than either ten (10%) percent or the amount allowed by the South Carolina Public Service Commission (PSC) if PSC approval is required. Notwithstanding the foregoing, Condor shall not increase the amount of the Monthly Fee because of any fine or penalty assessed by any regulatory agency to Condor for any act or omission by Condor for repairs or replacements to the Premises, including the Pump Station and Force Main, that are the result of the negligent or intentional acts or omissions of Condor.

4. CONSENT BY METROPOLITAN. Metropolitan hereby consents to the terms of this Agreement.

5. RESERVE ACCOUNT BY ACADIA. Acadia shall pay to Condor, upon execution of the Agreement, the amount of Seventeen Thousand Five Hundred Dollars ($17,500.00) as an initial payment into a reserve account for the purposes and uses herein provided. If Acadia does not construct the Pump Station and Force Main by December 31, 2006 or otherwise defaults on its requirements under this Agreement, this reserve payment becomes the property of Condor as liquidated damages. Upon transfer of the Pump Station and Force Main to Condor and prior to the initial operation of the Pump Station and Force Main to serve the development, Acadia shall pay to Condor an additional amount of Seventeen Thousand Five Hundred Dollars ($17,500.00) into a reserve account. These amounts shall cover payments for the first 140 houses connected to and served by the Pump Station and Force Main. Upon the initial service to any additional houses or commercial buildings Acadia shall pay into the reserve account an additional amount of Two Hundred Dollars ($200.00) per house and Fifty Dollars per One Hundred Gallons ($50.00/100) of design wastewater loading per each additional commercial building upon issuance of a construction permit for each house or building. After the Reserve Account equals One Hundred Thousand Dollars ($100,000) no further payments into the Reserve Account will be required from Acadia for connection of additional of homes or commercial buildings on the Premises to the wastewater system.

The parties hereto agree that the reserve account may be drawn on by Condor, or by Metropolitan in the event Condor shall have defaulted hereunder, for providing casualty insurance which shall be carried and maintained by Condor for the Pump Station and Force

Main, and for replacement of the Pump Station or Force Main, or any portion thereof, if damaged by accident, vandalism or other disaster for which damage is not covered by casualty insurance. Further, all or any portion of said reserve account may be used by Condor to pay for the reasonable costs and expenses of emergency repairs, compliance with Capacity, Management, Operations, and Maintenance (CMOM) requirements with which Condor may have to comply, installation and upgrade of a Supervisory Control and Data Acquisition system (SCADA), and closure of the Pump Station and Force Main if required of Condor by the appropriate governmental authorities.

6. NOTICES. Any notices which may be permitted or required under the terms and provisions of this Agreement shall be in writing and shall be deemed to have been duly given, except as otherwise provided in this Agreement, as of the date and time are received by the parties to whom the notices are sent. Such notices shall be deemed received upon hand delivery or by Federal Express or equivalent courier and evidenced by a notation on the records of that courier that such notices were delivered to the parties at the following addresses or at such other address as a party shall notify the other parties in writing:

(a) Acadia, LLC
Suite 150, Innovate Building
148 River Street
Greenville, SC 29601

(b) Condor Environmental, LLC
P.O. Box 10005
Greenville, SC 29603

(c) Metropolitan Sewer Sub-District
120 Augusta Arbor Way
Greenville, SC 29605

7. TERM. The term of this Agreement shall commence on the date on which this Agreement shall be executed by all parties hereto and shall continue in full force and effect until such time, if any, as Condor shall have transferred and conveyed the Pump Station and Force Main to a governmental subdivision of the State of South Carolina which shall have all power and authority necessary to operate and maintain the Pump Station and Force Main and shall have agreed with Acadia to do so.

In addition to the above, this Agreement may terminate in the following ways:

(a) This Agreement will terminate if a public entity agrees to assume the operation of the Premises;

(b) If the Pump Station and Force Main is replaced by a gravity sewer line, the Agreement shall terminate effective upon the date that the gravity sewer line is placed into operation;

(c) Condor may assign the Agreement upon ninety (90) days prior written notice to Acadia provided that prior to assignment Condor has identified for Acadia and Acadia has approved a successor entity that is properly qualified and licensed.

(d) Acadia may terminate the Agreement upon thirty (30) days prior written notice to Condor, if inadequate or improper operation or maintenance of the Pump Station or Force Main by Condor causes any of the following conditions, (i) an interruption of service, (ii) a sewage back, or (iii) a sewage overflow out of the Pump Station or Force Main; and, any such condition or combination of conditions occurs more than two times during any rolling twelve (12) month period. However, occurrence of any of the prior described conditions, caused by an Act of God or by some third party not under the control of Condor, is excused, so long as Condor uses its best efforts to remedy this condition and restore normal sewer service. In the event Condor causes two failure conditions during a twelve month period or otherwise fails to comply with the requirements of this paragraph, Acadia has the option, but not the obligation, to require Condor to promptly deed the Pump Station and Force Main back to Acadia and return any amount remaining in the reserve account with accrued interest.

8. METROPOLITAN APPROVAL. Notwithstanding the foregoing, however, any operation of the Pump Station and Force Main by any person, party or entity other than Condor, as herein provided, shall be subject to the approval of Metropolitan, the South Carolina Department of Health and Environmental Control. Upon the approval of said transfer and conveyance to a third party operator by such a governmental authority and the completion of said transfer, Condor shall be automatically released from all further duties or obligations under the terms of this Agreement that arise after the date of transfer.

9. APPLICATION OF LAWS. This Agreement is governed by the laws of South Carolina.

10. INSURANCE. For the duration of this Agreement, Condor shall keep in full force and effect a policy or policies of public liability, personal and property damage insurance with respect to Pump Station and Force Main of not less than $1,000,000.00 with a $5 million umbrella coverage, and which includes Acadia as an additional insured. The insurance shall be with a good and solvent insurance company licensed to do business in South Carolina.

11. AMENDMENTS. This Agreement and any provision herein contained may be modified or amended only by the express written consent of all of the parties hereto or their successors or assigns.

12. ASSIGNMENT. Condor may not assign this Agreement to any other party without the express written consent of Acadia, its successors or assigns. It is anticipated that Acadia will assign its rights and duties to a property owners association at some later date. Acadia may assign this Agreement to any entity upon written notice to Condor.

13. WAIVER OF DEFAULT. No waiver of any default by any party hereto will be implied from the failure by any other party to take action with respect to such default. No express waiver of any default will affect any default or extend any period of time for performance other than as specified in such express waiver. One or more waivers of any default in the performance of any provision of this Agreement will not be deemed a waiver of any subsequent default in the performance of the same provision or any other provision. The consent to or approval of any subsequent similar act or request by any party hereto will not be deemed to waive or render unnecessary the consent to or approval of any subsequent similar act or request. The rights or remedies provided by this Agreement are cumulative and no right or remedy will be exclusive of any other, or of any other right or remedy at law or in equity which any party hereto might otherwise have by virtue of a default under this Agreement. The exercise of any right or remedy by any party hereto will not impair such Party's standing to exercise any other right or remedy.

14. SEVERABILITY. If any provision of this Agreement is, to any extent, declared by a court of competent jurisdiction to be invalid or unenforceable, the remainder of this Agreement (or the application of such provision to persons or circumstances other than those in respect to which the determination of invalidity or unenforceability was made) will not be affected thereby and each provision of this Agreement will be valid and enforceable to the fullest extent permitted by law.

15. CAPTIONS. The captions of the sections of this Agreement are for convenience only and are not intended to affect the interpretation or construction of the provisions herein contained.

16. BINDING EFFECT. This Agreement shall be binding upon and shall inure to the benefit of the parties hereto and their respective heirs, executors, administrators, legal representatives, successors and assigns.

17. ENTIRE AGREEMENT. This Agreement constitutes the sole and only agreement of the parties hereto and supersedes any prior understanding or written or oral agreements between the parties respecting the within subject matter, and may be amended only by a writing signed by the parties hereto.

The remainder of this page is blank.

IN WITNESS WHEREOF, the parties hereto each of who being duly authorized have set their hands and seals on the day and year first above written.

ACADIA, LLC

By: _____

Its: Manager

DATED: 10.19.05

CONDOR ENVIRONMENTAL, LLC

By: _____

Its: Vice President

DATED: 10-19-05

METROPOLITAN SEWER SUB-DISTRICT

By: _____

Its: GENERAL MANAGER

DATED: 10-19-05

Re: The Acadia Pump Station and Force Main Agreement

April 3, 2006

To Whom It May Concern:

On October 19, 2005 Acadia (Acadia), LLC; Condor Environmental, LLC (Condor) and Metropolitan Sewer Subdistrict (Metropolitan) entered into a Pump Station and Force Main Agreement (the "Agreement") for Condor to own and operate the Pump Station and Force Main (PSFM) for the Acadia Subdivision in Greenville County.

This letter is to clarify that if under this Agreement, Condor were to default on its responsibilities under the Agreement, to the point that further performance under the Agreement were impracticable or unacceptable; or, if Condor were to go out of business, without establishing a proper successor under the Agreement, then Metropolitan would provide temporary operation and maintenance of the PSFM for a period of up to but not in excess of one hundred eighty (180) days. Acadia, as the Declarant or the Acadia Property Owners Association (POA) [to be formed] as successor to said Declarant is responsible for obtaining a qualified private utility to substitute for Condor. In the interim, while Metropolitan is operating and maintaining the PSFM, the POA will pay to Metropolitan, the monthly payments that previously were paid to Condor.

Acknowledged and agreed to on the date written above:

ACADIA, LLC

By: _____

Its: President

Date: 4.3.06

METROPOLITAN SEWER SUB-DISTRICT

By: _____

Its: General Manager

Date: 4-3-06

CONDOR ENVIRONMENTAL, LLC

By: _____

Its: President

Date: 4-3-06

On behalf of the ACADIA PROPERTY OWNERS ASSOCIATION , Declarant Acadia, LLC:

By: _____

Its: President

Date: 4.3.06

Exhibit B 2

D H E C

PROMOTE PROTECT PROSPER

RECEIVED MAY 01 2007

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

Wastewater System Construction

PARTIAL APPROVAL TO PLACE INTO OPERATION

ISSUED TO: ACADIA DEVELOPMENT CO LLC
148 RIVER ST STE 150
GREENVILLE SC 29601

for the operation of a wastewater treatment/collection system permitted under construction permit 32494-WW, dated May 12, 2006 as described below

PROJECT NAME:	ACADIA PUMP STATION PH 1
COUNTY:	Greenville
PROJECT DESCRIPTION:	A Triplex submersible pump station with 8300 LF of parallel 6" and 8" force mains to serve future development.
PERMITTED FLOW:	0 gallons per day
WWTP:	WCRSA GEORGES CREEK (SC0047309)

SPECIAL CONDITIONS: This Partial Permit to Operate is issued under the condition that the remainder of the project must be completed prior to the expiration date indicated on the construction permit issued by the Department for the construction permit to remain valid.

1. This is a partial permit awaiting confirmation that the diesel generator is operable for use in the case of emergency.

This approval is based on the Engineer's letter of certification signed by Joe Barron, P.E., South Carolina Registration No. 7671.

Angie Price

Date Issued: April 25, 2007

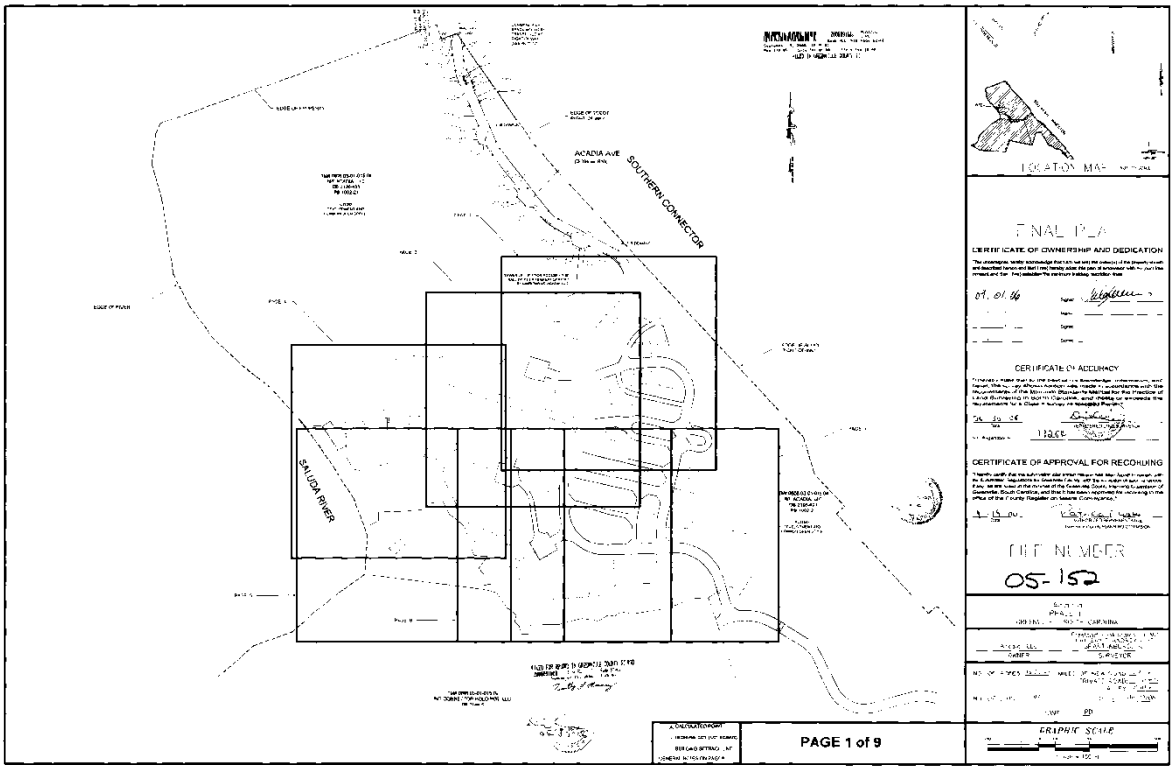
Angie Price, District Engineer
Environmental Quality Control
Greenville EQC Office

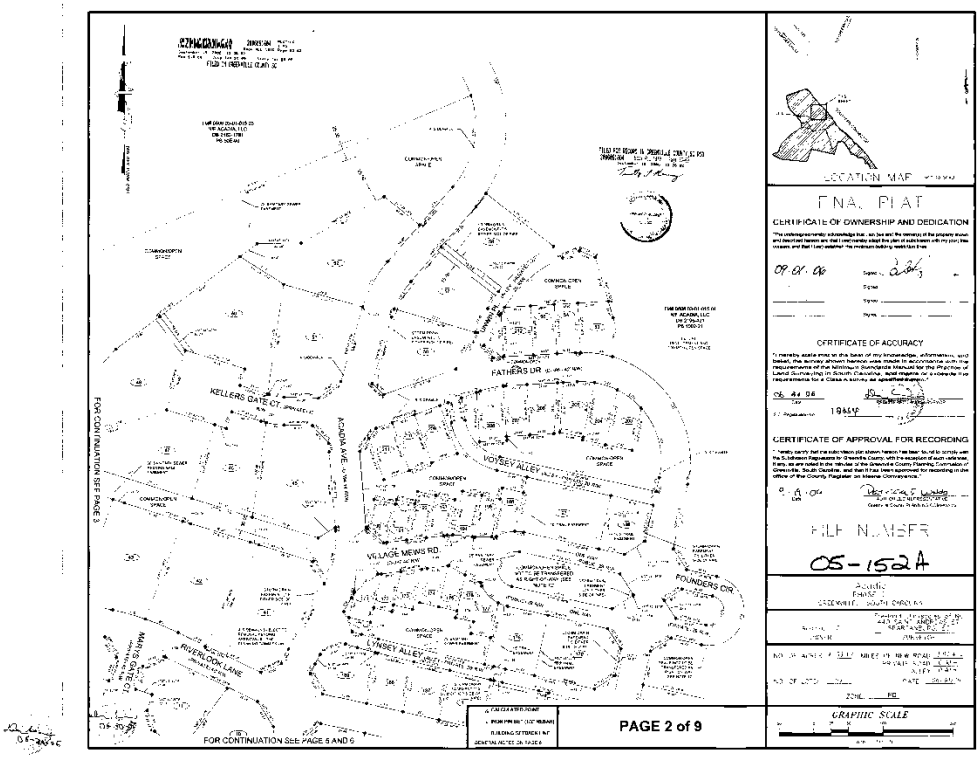
cc: Bureau of Water Permitting File
Local Environmental Health Office
Local Codes
Joe Barron, P.E.
Condor Environmental, LLC
Metro Sewer Sub-Distict

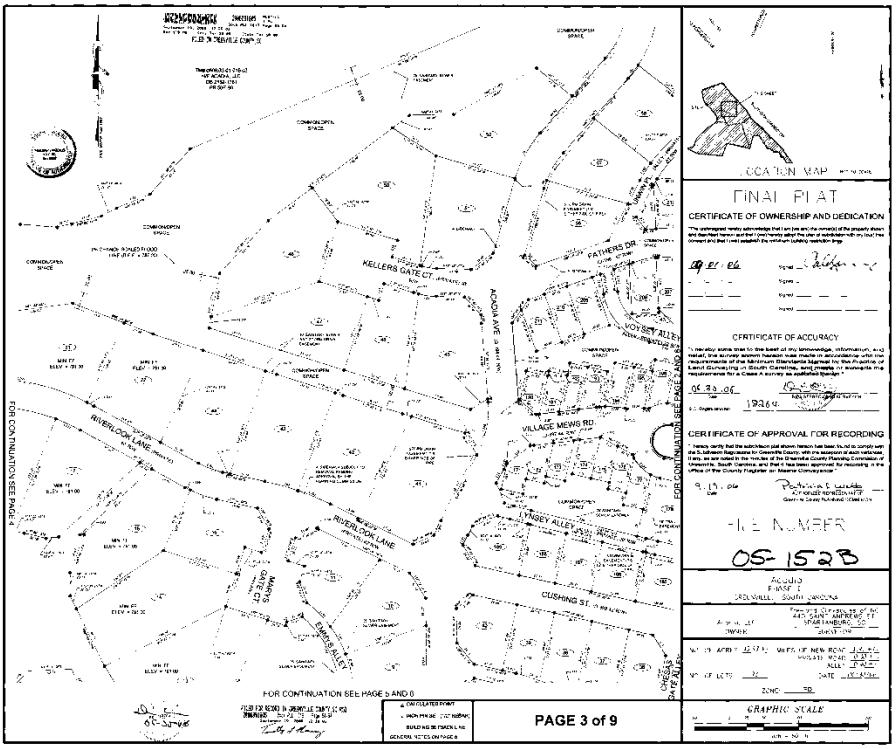
SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
Region 2
Serving Cherokee, Greenville, Pickens, Spartanburg and Union Counties
Greenville EQC Office • 301 UNIVERSITY RIDGE STE 500 • GREENVILLE SC 29601 • Phone: 864-241-1090 •
www.scdhec.gov

I

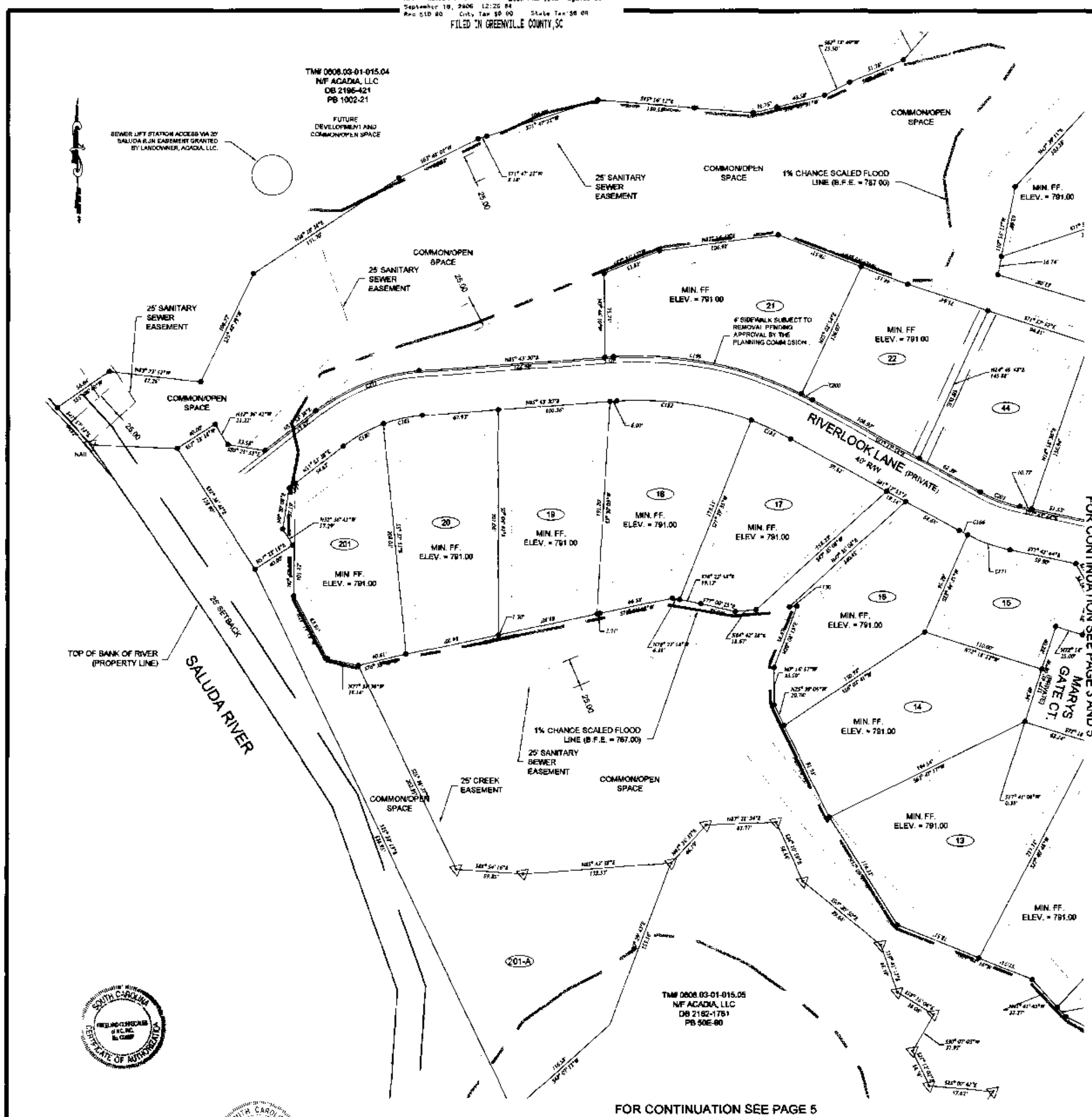
Exhibit B 3


ACADIA AVE
SOUTHERN CONNECTOR
SALUDA RIVER
FINAL PLAT
CERTIFICATE OF OWNERSHIP AND DEDICATION
CERTIFICATE OF ACCURACY
CERTIFICATE OF APPROVAL FOR RECORDING
FILE NUMBER
05-152
PAGE 1 of 9
GRAPHIC SCALE


FINAL PLAT
CERTIFICATE OF OWNERSHIP AND DEDICATION
CERTIFICATE OF ACCURACY
CERTIFICATE OF APPROVAL FOR RECORDING
FILE NUMBER
05-152A
FATHERS DR
KELLERS GATE CT
ACADIA AVE
VOYSEY ALLEY
VILLAGE MEWS RD
FOUNDERS DR
RIVERLOOK LANE
LYNSEY ALLEY
FOR CONTINUATION SEE PAGE 5
FOR CONTINUATION SEE PAGE 5 AND 6
PAGE 2 of 9
GRAPHIC SCALE


KELLERS GATE CT
FATHERS DR
ACADIA AVE
VILLAGE MEWS RD
RIVERLOCK LANE
ABBEY ALLEY
CUSHING ST
FOR CONTINUATION SEE PAGE 4
FOR CONTINUATION SEE PAGE 5 AND 6
LOCATION MAP
FINAL PLAT
CERTIFICATE OF OWNERSHIP AND DEDICATION
CERTIFICATE OF ACCURACY
CERTIFICATE OF APPROVAL FOR RECORDING
FILE NUMBER
OS-1523
ACADIA
PHASE 1
GREENVILLE, SOUTH CAROLINA
ZONE PD
GRAPHIC SCALE
PAGE 3 of 9

FILED IN GREENVILLE COUNTY, SC
2006091686 PLAT/LG
September 19, 2006 12:25 04
Book PLL 1010 Page 65-65



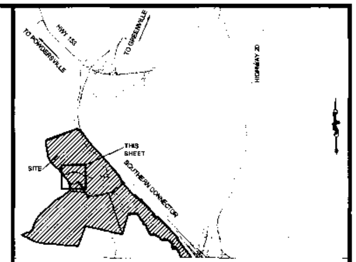
FOR CONTINUATION SEE PAGE 3 AND 5

FOR CONTINUATION SEE PAGE 5

▲ CALCULATED POINT
• IRON PIN SET (1/2" REBAR)
BUILDING SETBACK LINE
GENERAL NOTES ON PAGE 5

FILED FOR RECORD IN GREENVILLE COUNTY, SC ROD
2006091686 Book PLL 1010 Page 65-65
September 19, 2006 12:25:04

PAGE 4 of 9



LOCATION MAP NOT TO SCALE

FINAL PLAT

CERTIFICATE OF OWNERSHIP AND DEDICATION

"The undersigned hereby acknowledge that I am (we are) the owner(s) of the property shown and described hereon and that I (we) hereby adopt this plan of subdivision with my (our) free consent and that I (we) establish the minimum building restriction lines.

09.01.06 Signed [signature]
Signed
Signed
Signed

CERTIFICATE OF ACCURACY

"I hereby state that to the best of my knowledge, information, and belief, the survey shown hereon was made in accordance with the requirements of the Minimum Standards Manual for the Practice of Land Surveying in South Carolina, and meets or exceeds the requirements for a Class A survey as specified therein."

06.30.06 [signature]
Date REGISTERED LAND SURVEYOR

S.C. Registration No 18264

CERTIFICATE OF APPROVAL FOR RECORDING

"I hereby certify that the subdivision plat shown hereon has been found to comply with the Subdivision Regulations for Greenville County, with the exception of such variances, if any, as are noted in the minutes of the Greenville County Planning Commission of Greenville, South Carolina, and that it has been approved for recording in the office of the County Register on Mesne Conveyance."

9.19.06 Patricia [signature]
Date AUTHORIZED REPRESENTATIVE
Greenville County PLANNING COMMISSION

FILE NUMBER

05-152C

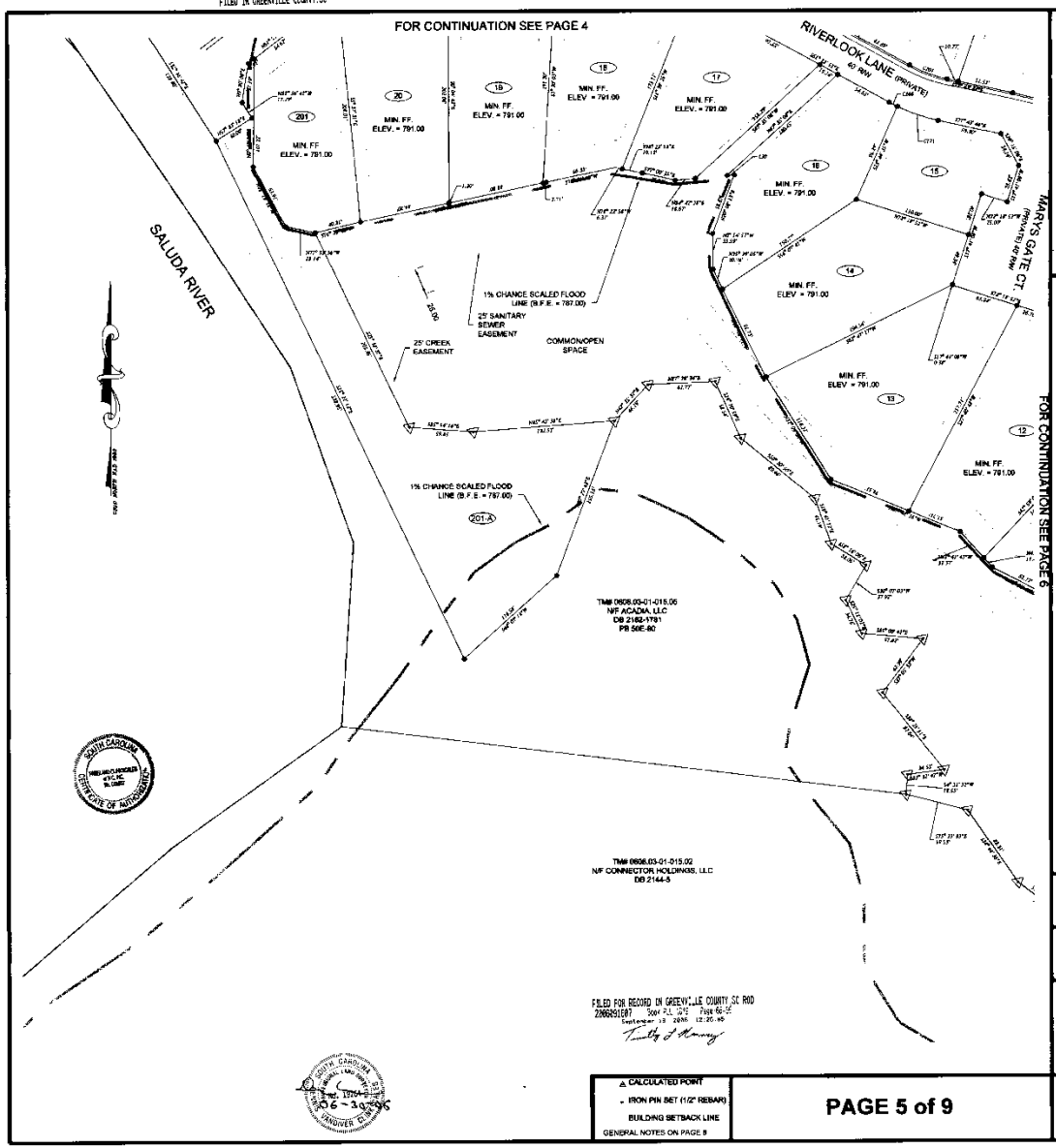
Acadia
PHASE I
GREENVILLE, SOUTH CAROLINA

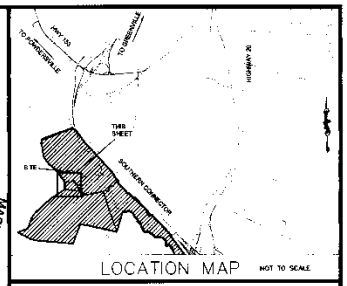
Acadia, LLC	Freeland Clinkscales of NC 440 SAINT ANDREWS ST. SPARTANBURG, SC
OWNER	SURVEYOR

NO. OF ACRES: 45.53 +/- MILES OF NEW ROAD: 1.97 +/-
PRIVATE ROAD: 0.30 +/-
ALLEY: 0.40 +/-
NO. OF LOTS: 93 DATE: 06/30/06
ZONE: PD

GRAPHIC SCALE
1 inch = 50 ft.

2006091687 PLAT/LI
1 Pg
Book:PLL 1613 Page:59-66
September 19 2006 12:35:05
Grnv Tax $0.00 Scale Tax:$0.00
Rec $10.00
FILED IN GREENVILLE COUNTY, SC





LOCATION MAP NOT TO SCALE

FINAL PLAT

CERTIFICATE OF OWNERSHIP AND DEDICATION

"The undersigned hereby acknowledge that I am (we are) the owner(s) of the property shown and described hereon and that I (we) hereby adopt this plan of subdivision with my (our) free consent and that I (we) establish the minimum building restriction lines.

09, 01, 06 Signed _____

_____ Signed _____

_____ Signed _____

_____ Signed _____

CERTIFICATE OF ACCURACY

"I hereby state that to the best of my knowledge, information, and belief, the survey shown hereon was made in accordance with the requirements of the Minimum Standards Manual for the Practice of Land Surveying in South Carolina, and that it meets or exceeds the requirements for a Class A survey as specified therein."

06, 30, 06 Date

_____ REGISTERED LAND SURVEYOR

S.C. Registration No. 18654

CERTIFICATE OF APPROVAL FOR RECORDING

"I hereby certify that the subdivision plat shown hereon has been found to comply with the Subdivision Regulations for Greenville County, with the exception of such variances, if any, as are noted in the minutes of the Greenville County Planning Commission of Greenville, South Carolina, and that it has been approved for recording in the office of the County Register on Meane Conveyance."

9, 19, 06 Date

Patricia F. Webb
AUTHORIZED REPRESENTATIVE
Greenville County PLANNING COMMISSION

FILE NUMBER

05-152D

Acadia
PHASE I
GREENVILLE, SOUTH CAROLINA

Acadia, LLC	Freeland Clinkscales of NC 440 SAINT ANDREWS ST. SPARTANBURG, SC
OWNER	SURVEYOR

NO. OF ACRES: 15.53 +/- MILES OF NEW ROAD: 1.97 +/-
ROAD: 0.30 +/-
ALLEY: 0.40 +/-
NO. OF LOTS: 93 DATE: 06/30/06
ZONE: PD

GRAPHIC SCALE
50 0 25 50 100 200
1 inch = 50 ft.

△ CALCULATED POINT
● IRON PIN SET (1/2" REBAR)
BUILDING SETBACK LINE
GENERAL NOTES ON PAGE 8

FILED FOR RECORD IN GREENVILLE COUNTY, SC ROD
2006091687 Book P.L. 1613 Page 66-72
September 19 2006 12:35:05

PAGE 5 of 9

2006091608 PLAT/1
1 PG
Book PL 1019 Page:67-67
September 19, 2006 12:20 pm
Rec $10.00 Cnty Tax $0.00 State Tax $0.00
FILED IN GREENVILLE COUNTY, SC

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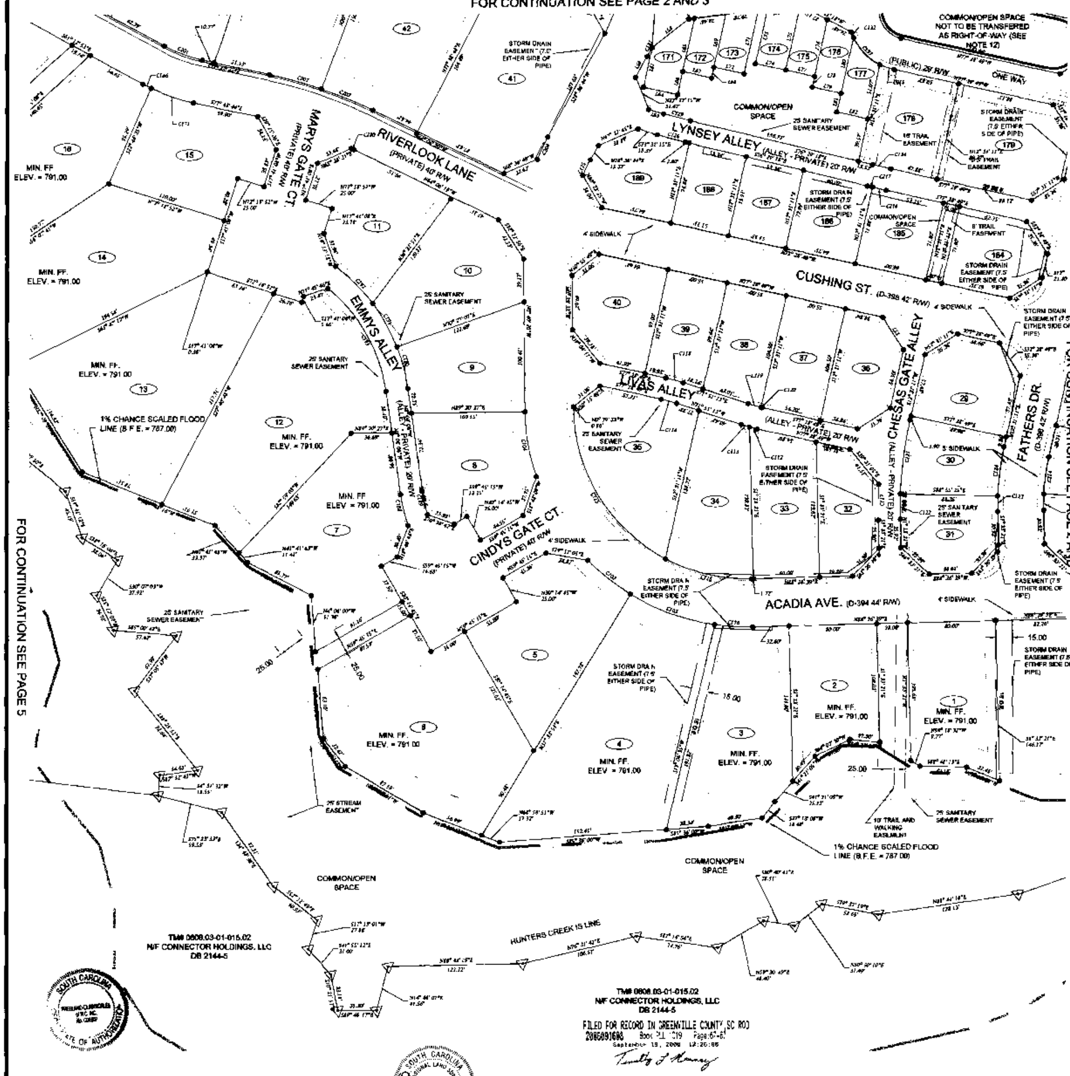

FOR CONTINUATION SEE PAGE 5

FOR CONTINUATION SEE PAGE 2 AND 3

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2006091608 Book PL 1019 Page:67-67
September 19, 2006 12:20:06

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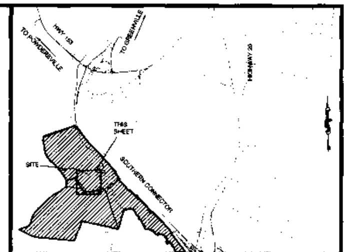
• IRON PIN SET (1/2" REBAR)
BUILDING SETBACK LINE
GENERAL NOTES ON PAGE 8



LOCATION MAP NOT TO SCALE

FINAL PLAT

CERTIFICATE OF OWNERSHIP AND DEDICATION

"The undersigned hereby acknowledge that I am (we are) the owner(s) of the property shown and described hereon and that I (we) hereby adopt this plan of subdivision with my (our) free consent and that I (we) establish the minimum building restriction lines."

09.01.06 Signed [signature]
/ / Signed
/ / Signed
/ / Signed

CERTIFICATE OF ACCURACY

"I hereby state that to the best of my knowledge, information, and belief, the survey shown hereon was made in accordance with the requirements of the Minimum Standards Manual for the Practice of Land Surveying in South Carolina, and meets or exceeds the requirements for a Class A survey as specified therein."

06/30/06 Date — [signature] REGISTERED LAND SURVEYOR
S.C. Registration No. 18264

CERTIFICATE OF APPROVAL FOR RECORDING

"I hereby certify that the subdivision plat shown hereon has been found to comply with the Subdivision Regulations for Greenville County, with the exception of such variances, if any, as are noted in the minutes of the Greenville County Planning Commision of Greenville, South Carolina, and that it has been approved for recording in the office of the County Register on Mesne Conveyance."

9/19/06 Date — Patricia [signature] AUTHORIZED REPRESENTATIVE, Greenville County PLANNING COMMISION

FILE NUMBER

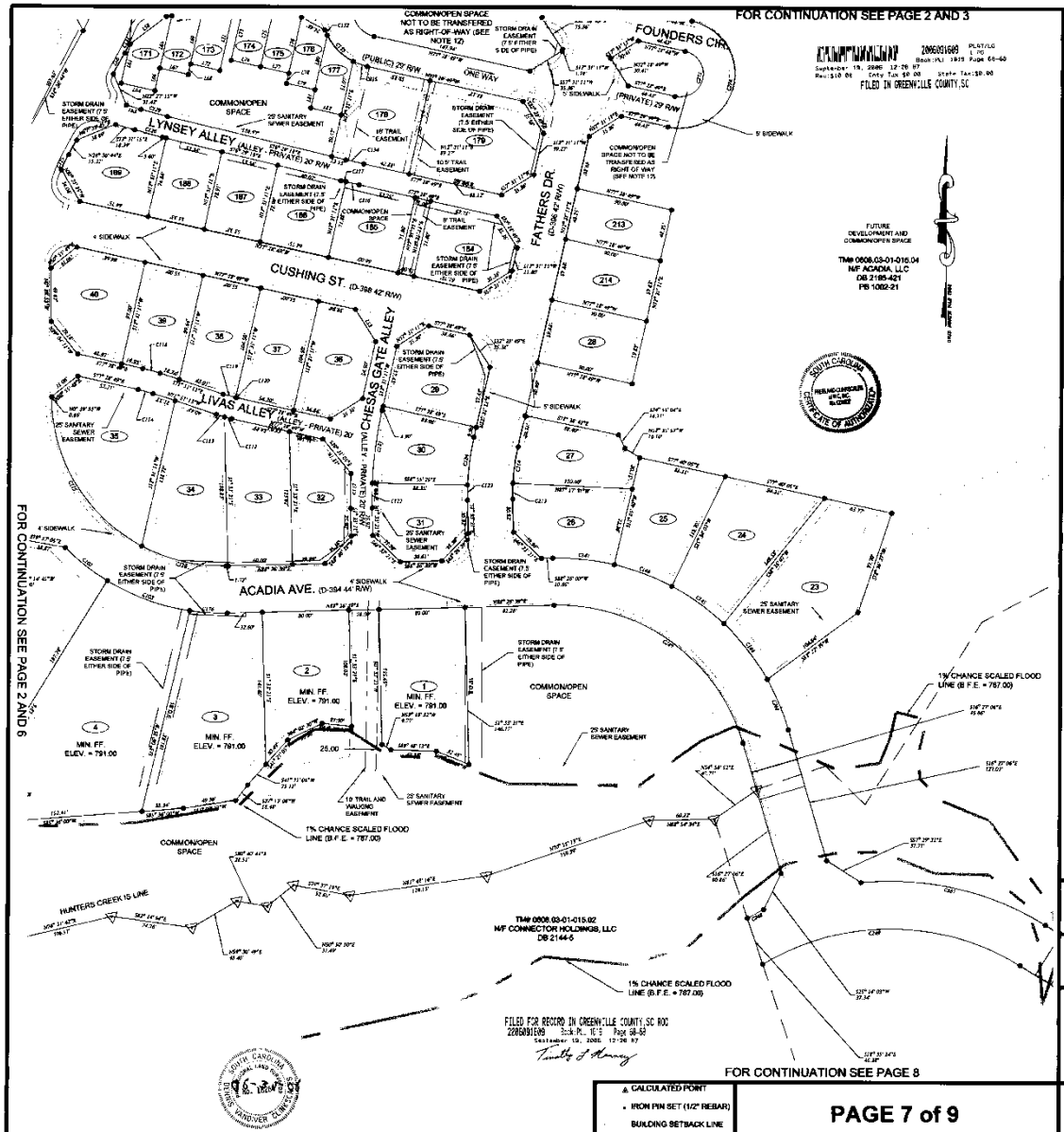
05-152E

Acadia
PHASE I
GREENVILLE, SOUTH CAROLINA

Acadia, LLC — OWNER
Freeland Clinkscales of NC, 440 SAINT ANDREWS ST., SPARTANBURG, SC — SURVEYOR

NO. OF ACRES: 45.53 +/- MILES OF NEW ROAD: 1.97 +/-
ROAD: 0.30 +/-
ALLEY: 0.10 +/-
NO. OF LOTS: 93 DATE: 06/30/06
ZONE: PD

GRAPHIC SCALE
1 inch = 50 ft.



2006091699 PLAT/LG
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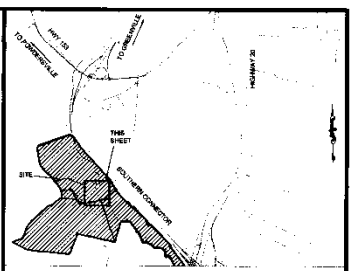
Rec:$10.00 Cnty Tax:$0.00 State Tax:$0.00
FILED IN GREENVILLE COUNTY, SC



LOCATION MAP NOT TO SCALE

FINAL PLAT

CERTIFICATE OF OWNERSHIP AND DEDICATION

"The undersigned hereby acknowledge that I am (we are) the owner(s) of the property shown and described hereon and that I (we) hereby adopt this plan of subdivision with my (our) free consent and that I (we) establish the minimum building restriction lines.

09, 01, 06 Signed _____

/ / Signed _____

/ / Signed _____

/ / Signed _____

CERTIFICATE OF ACCURACY

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09 / 30 / 06 _____
Date REGISTERED LAND SURVEYOR

S.C. Registration No. 18264

CERTIFICATE OF APPROVAL FOR RECORDING

"I hereby certify that the subdivision plat shown hereon has been found to comply with the Subdivision Regulations for Greenville County, with the exception of such variances, if any, as are noted in the minutes of the Greenville County Planning Commission of Greenville, South Carolina, and that it has been approved for recording in the office of the County Register on Mesne Conveyance."

9 / 19 / 06 Patricia F. Wells
Date AUTHORIZED REPRESENTATIVE
Greenville County PLANNING COMMISION

FILE NUMBER

05-152F

Acadia
PHASE 1
GREENVILLE, SOUTH CAROLINA

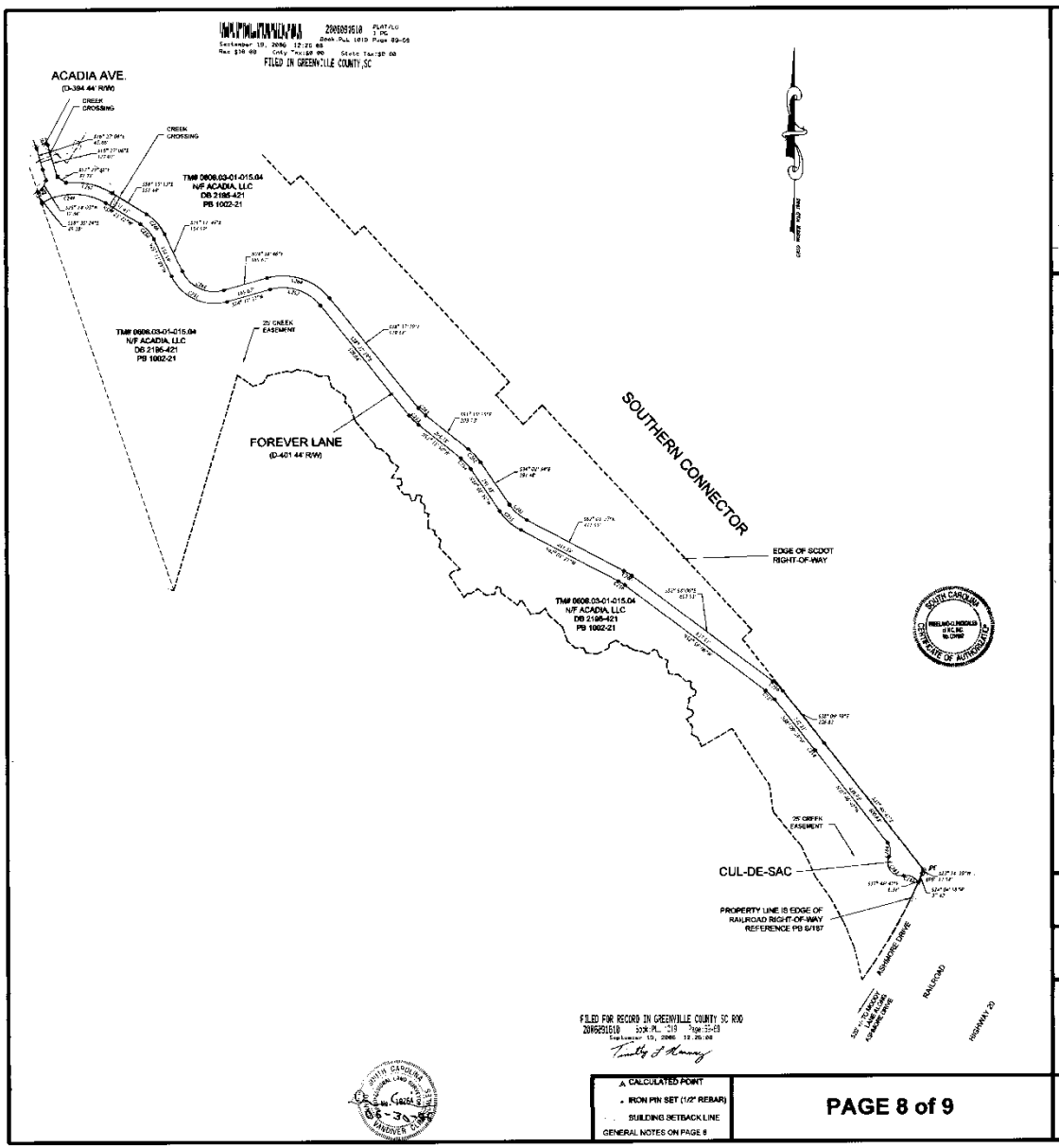
Acadia, LLC	Freeland Clinkscales of NC 440 SAINT ANDREWS ST. SPARTANBURG, SC
OWNER	SURVEYOR

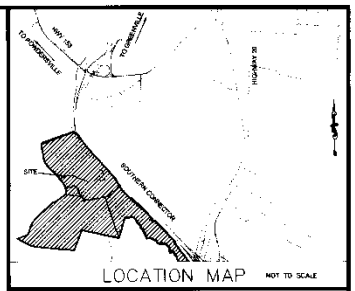
NO. OF ACRES: 45.53 +/- MILES OF NEW ROAD: 1.97 +/-
ROAD: 0.30 +/-
ALLEY: 0.40 +/-
NO. OF LOTS: 93 DATE: 06/30/06
ZONE: PD

GRAPHIC SCALE
50 0 25 50 100 200
1 inch = 50 ft.

▲ CALCULATED POINT
• IRON PIN SET (1/2" REBAR)
BUILDING SETBACK LINE
GENERAL NOTES ON PAGE 9

PAGE 7 of 9





LOCATION MAP NOT TO SCALE

FINAL PLAT

CERTIFICATE OF OWNERSHIP AND DEDICATION

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09.01.06 Signed _____

__/__/__ Signed _____

__/__/__ Signed _____

__/__/__ Signed _____

CERTIFICATE OF ACCURACY

"I hereby state that to the best of my knowledge, information, and belief, the survey shown hereon was made in accordance with the requirements of the Minimum Standards Manual for the Practice of Land Surveying in South Carolina, and meets or exceeds the requirements for a Class A survey as specified therein."

06,30,06 _____
Date REGISTERED LAND SURVEYOR

S.C. Registration No. 18264

CERTIFICATE OF APPROVAL FOR RECORDING

"I hereby certify that the subdivision plat shown hereon has been found to comply with the Subdivision Regulations for Greenville County, with the exception of such variances, if any, as are noted in the minutes of the Greenville County Planning Commission of Greenville, South Carolina, and that it has been approved for recording in the office of the County Register os Mesne Conveyance."

9,19,06 _____
Date AUTHORIZED REPRESENTATIVE
Greenville County PLANNING COMMISION

FILE NUMBER

05-152G

Acadia
PHASE I
GRLENVILLE, SOUTH CAROLINA

Acadia, LLC	Freelanc Clinkscales of NC 440 SAINT ANDREWS ST. SPARTANBURG, SC
OWNER	SURVEYOR

NO. OF ACRES: 45.53 +/- MILES OF NEW ROAD: 1.97 +/-
ROAD: 0.30 +/-
ALLEY: 0.40 +/-
NO. OF LOTS: 93 DATE: 06/30/06
ZONE: PD

GRAPHIC SCALE
200 0 100 200 400 800
1 inch = 200 ft.

▲ CALCULATED POINT
● IRON PIN SET (1/2" REBAR)
BUILDING SETBACK LINE
GENERAL NOTES ON PAGE 8

PAGE 8 of 9

Exhibit B 4

Fletcher Group
ENGINEERING & ENVIRONMENTAL SOLUTIONS

TECHNICAL SPECIFICATIONS

ACADIA DEVELOPMENT
GRAVITY SEWER
SEWAGE PUMPING STATION AND FORCE MAIN

January 2006

Prepared For:

Acadia Development Company, LLC
148 River Street, Suite 120
Greenville, South Carolina 29601

Prepared By:

Fletcher Group, Inc.
148 River Street, Suite 220
Greenville, South Carolina 29601

SOUTH CAROLINA FLETCHER GROUP, INC. NO. C00623 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER NO. 7671 JOE M. BARRON

Joe M. Barron, P.E.
Project Manager

Thomas E. Vollmar

Thomas Vollmar, P.E.
Project Engineer

SECTION 02221
TRENCHING, BACKFILLING FOR UTILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Trench, backfill, and compact as specified herein and as needed for installation of underground utilities associated with the Work.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
2. Section 02660 - Water Distribution System.
3. Section 02722 - Sewers: Sanitary, Gravity.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.

1.3 JOB CONDITIONS

A. Existing utilities:

1. There now exists in the construction areas, waterworks, storm drainage, sanitary sewers, street paving, gas mains and other utilities.
2. Approximate location of certain underground lines and structures are shown on the plans for information only, other underground lines or structures are not shown.
3. Locate these and other possible unknown utility lines using electronic pipe finder, or other approved means.
4. Locate, excavate and expose all existing underground lines in advance of trenching operations.
5. The Contractor will be held responsible for the workmanlike repair of any damage done to any of these utilities in the execution of his work under this Section.
6. The Contractor shall familiarize himself with the existing conditions and be prepared to adequately care for and safeguard himself and the Owner from damage.

B. Notification of intent to excavate:

1. South Carolina Underground Utility Damage Prevention Act (S.C. Code Ann, 58-35-10, CT-SEQ, Supp. 1978) requires persons to ascertain the location of underground public utility property prior to excavation or demolition in certain situations. The Act also requires such persons to give timely notice of intent to excavate or demolish prior to commencing such operations. Failure to comply could subject the violator to a civil penalty of up to one thousand dollars ($1,000) for each violation of the Act.
2. Notification of intent to excavate may be given by calling this toll free number: 1-800-922-0983.

C. Protecting trees, shrubbery and lawns:

1. Trees and shrubbery in developed areas and along the trench line shall not be disturbed unless absolutely necessary, and subject to the approval of the Engineer.
   a. Any such trees and shrubbery necessary to be removed shall be heeled in and replanted.
2. Where trenches cross private property through established lawns, sod shall be cut, removed, stacked and maintained in suitable condition until replacement is approved by the Engineer.
   a. Topsoil underlying lawn areas shall be removed and kept separate from general excavated materials.

D. Clearing:

1. Perform all clearing necessary for installation of the complete work.
2. Clearing shall consist of removing all trees, stumps, roots, brush and debris in the rights-of-way obtained for the Work.
3. All timber of merchantable size shall remain the property of the Owner and shall be trimmed and cut in such lengths as directed and stacked along the edge of the right-of-way.
4. All other material, including trimmings from above, shall be completely disposed of in a satisfactory manner.

E. Removing and resetting fences:

1. Where existing fences must be removed to permit construction of utilities:
   a. Remove such fences and, as the Work progresses, reset the fences in their original location and condition.
   b. Provide temporary fencing or other safeguards as required to prevent stock and cattle from wandering to other lands.

F. Restoration of disturbed areas:

1. Restore all areas disturbed by, during or as a result of construction activities to their existing or better condition.
2. Do not interpret this as requiring replacement of trees and undergrowth in undeveloped sections of the rights-of-way.

G. Minimizing silting and bank erosion during construction:

1. During construction, protective measures shall be taken and maintained to minimize silting and bank erosion of creeks and rivers adjacent to the work being performed during construction.
2. Sack breakers are to be used on steep slopes along creek banks and fill slopes to prevent washing of ditch. Sack breakers are to be placed at the direction of the Engineer.
3. Follow approved Erosion Control Plan shown in plans.

H. Blasting:

1. Store all explosives in a secure manner, complying with all laws, ordinances, and regulations.
2. Contractor shall be responsible for damage caused by blasting operations.

PART 2 - PRODUCTS

2.1 EXCAVATED MATERIALS

A. Perform all excavation of every description and of whatever substances encountered to depths indicated or specified.

B. Pile material suitable for backfilling in an orderly manner at safe distance from banks or trenches to avoid overloading and to prevent slides or cave-ins.

C. Remove and deposit unsuitable or excess materials as directed by the Engineer.

2.2 BACKFILL MATERIALS

A. Provide from materials excavated for installation of utility.

1. Select soil material free from organic matter and deleterious substances, containing no rocks or lumps over 2" in greatest dimension for backfill up to 12" above top of utility being covered.
2. Do not permit rocks larger than 2" in greatest dimension in top 6" of backfill.

2.3 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 PROCEDURES

A. Existing utilities:

1. Unless shown to be removed, protect active utility lines shown on the drawings or otherwise made known to the Contractor prior to trenching. If damaged, repair or replace at no additional cost to the Owner.
2. If active utility lines are encountered and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Engineer and secure his instructions.
5. Do not proceed with permanent relocation of utilities until written instructions are received from the Engineer.

B. Locations within streets or highways:

1. Comply with South Carolina Department of Transportation's (SCDOT) "Encroachment Permit" issued for the Work, and the South Carolina Department of Transportation's (SCDOT) "*A Policy for Accommodating Utilities on Highway Rights-of-Way*".
2. Take all precautions and comply with all requirements as may be necessary to protect the improvements, including barricades for protection of traffic.
3. Keep minimum of one lane open to traffic at all times where utility crosses street or highway.

C. Protection of persons and property:

1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout and other hazards created by operations under this Section.

D. Dewatering:

1. Remove all water, including rain water, encountered during trench and sub-structure work to an approved location by pumps, drains, and other approved methods.
2. Keep trenches and site construction area free from water.

E. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.

F. Maintain access to adjacent areas at all times.

3.2 TRENCH EXCAVATION (Classified)

A. Remove all materials of whatever substance encountered, additional payment to be made for rock excavation as hereinafter defined and specified.

1. Rock excavation to consist of the removal and disposal of the following materials:
   a. Boulders 1 cubic yard or more in volume.
   b. Solid rock.
   c. Materials that cannot be removed without systematic drilling and blasting, such as rock material in ledges or aggregate conglomerate deposits that are so firmly cemented as to possess the characteristics of solid rock.
   d. Concrete and masonry structures exceeding 1 cubic yard in volume except sidewalks and paving.
2. Rock excavation does not include:
   a. Boulders, concrete or masonry structures less than 1 cubic yard in volume.
   b. Hard and compact materials such as cemented gravel and relatively soft or disintegrated rock that can be removed without continuous and systematic drilling and blasting.
   c. Material removed by intermittent drilling and blasting performed to increase production.
3. Do not remove material claimed as rock until the Engineer has classified and cross-sectioned same.

B. Where trenching occurs in existing lawns, remove turf in sections and keep damp. Replace turf upon completion of the backfilling.

C. Open cut:

1. Excavate for utilities by open cut.
2. If conditions at the site prevent such open cut, and if approved by the Engineer, tunneling may be used.
3. Short sections of a trench may be tunneled if, in the opinion of the Engineer, the conductor can be installed safely and backfill can be compacted properly into such tunnel.
4. Remove boulders and other interfering objects, and backfill voids left by such removals, at no additional cost to the Owner.
5. Remove wet or otherwise unstable soil incapable of properly supporting the utility, as determined by the Engineer, to depth required and backfill to proper grade with stone bedding material, at no additional cost to the Owner.
6. Excavating for appurtenances:
   a. Excavate for manholes and similar structures to a distance sufficient to leave at least 12" clear between outer surfaces and the embankment or shoring that may be used to hold and protect the banks.
   b. Overdepth excavation beyond such appurtenances that has not been directed will be considered unauthorized. Fill with sand, gravel, or lean concrete as directed by the Engineer, and at no additional cost to the Owner.

D. Trench to the minimum width necessary for proper installation of the utility, with sides as nearly vertical as possible. Accurately grade the bottom to provide uniform bearing for the utility.

E. Provide sheeting and shoring necessary for protection of the Work and for the safety of personnel.

1. Remove in units when level of backfilling has reached the elevation necessary to protect the utility work and adjacent property.
2. Sheeting at the bottom of trenches over 10' deep, for sewers 15" and larger in size, shall remain in place and be cut off no less than 2' above top of pipe, at no additional cost to the Owner.
3. When, in the opinion of the Engineer, other sheeting cannot be safely removed, it shall be left in place and the Contractor will be paid for such sheeting at the prices bid.
   a. Cut such sheeting off at least 2' below finished surface.
   b. No lumber for sheeting or shoring exceeding that size customarily used will be paid for unless the use of larger sizes has been ordered, in writing, by the Engineer.

F. Depressions:

1. Dig bell holes and depressions for joints after the trench has been graded. Provide uniform bearing for the pipe on prepared bottom of the trench.
2. Except where rock is encountered, do not excavate below the depth indicated or specified.
3. Where rock is encountered, excavate rock to a minimum overdepth of 4" below the trench depth indicated or specified, and to provide 6" clearance in any horizontal direction from all parts of the utility and appurtenances.

G. Special requirements relating to excavation for specific types of utilities shall comply with the following:

1. Water distribution lines:
   a. Provide depth of cover shown or minimum cover of 30", whichever is greater.
   b. Where minimum cover only is required, carry excavations to depths necessary to properly grade the pipe on tangents and vertical curves as directed by the Engineer.
   c. Provide minimum clearance of 6" between pipe walls and trench walls or sheeting and bracing lines.
   d. If minimum cover of 30" cannot be provided, then thermoplastic piping may not be used. Use ductile iron piping or other Engineer-approved material.
2. Sanitary or storm sewer lines:
   a. Comply with requirements of Section 02722. Do not excavate trench more than 200' ahead of pipe laying, unless permitted by Engineer.
   c. Maintain trench sides vertical to point not less than 2' above top of pipe.
   d. Upper portion of trench may be sloped to any width which will not cause damage to adjoining structures, utilities, pavements or private property.

H. Comply with pertinent OSHA regulations in regards to the excavation of utilities.

3.3 BACKFILLING

A. General:

1. Backfill trenches and excavations immediately after the pipes are laid, unless other protection is directed or indicated.
2. Select and deposit backfill materials with special reference to the future safety of the pipes.
3. Reopen trenches which have been improperly backfilled, to a depth as required for proper compaction. Refill and compact as specified, or otherwise correct to the approval of the Engineer.
4. Surplus material shall be disposed of as directed by the Engineer.
5. Original surface shall be restored to the approval of the Engineer.

B. Lower portion of trench:

1. Deposit approved backfill and bedding material in layers of 6" maximum thickness, and compact with suitable tampers to the density of the adjacent soil until there is a cover of not less than 24" over sewers and 12" over other utility lines.
2. Take special care in backfilling and bedding operations not to damage pipe and pipe coatings.

C. Remainder of trench:

1. Except for special materials for pavements, backfill the remainder of the trench with material free from stones larger than 6" or □ the layered thickness, whichever is smaller, in any dimension.
2. Deposit backfill material in layers not exceeding the thickness specified, and compact each layer to the minimum density directed by the soil engineer.

D. Adjacent to buildings: Mechanically compact backfill in 6" layers within ten (10') feet of buildings.

E. Under roads, streets and other paved areas:

1. Mechanically tamp in 6" layers using heavy duty pneumatic tampers or equal.
2. Tamp each layer to a density equivalent of not less than 100% of an ASTM D698 Proctor Curve.
3. Provide additional compaction by leaving the backfilled trench open to traffic while maintaining the surface with crushed stone.
4. Refill any settlement with crushed stone and continue such maintenance until replacement of pavement is authorized by the Engineer.

F. Undeveloped areas:

1. Backfill in wooded, swampy or undeveloped areas shall be as specified hereinbefore, except that tamping of the backfill above a level 2' over the top of the pipe will not be required.
2. Mound excavated material neatly over the ditch to provide for future settlements.

3.4 EXCAVATION BY JACKING-BORING

A. Install casings where indicated by jacking and boring.

B. Comply with Section 02780.

END OF SECTION

SECTION 02722
SEWERS: SANITARY, GRAVITY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide sanitary sewerage system as shown on the drawings, specified herein, and needed for a complete and proper installation.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
2. Section 02221 - Trenching, Backfilling for Utilities.
3. Section 02780 - Casing Pipes for Utilities.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

A. Required data to be submitted to the Engineer in triplicate.

B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Materials list of items proposed to be provided under this Section.
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.4 PRODUCT HANDLING

A. General:

1. Carefully and properly protect all materials of every description, both before and after being used in the Work in accordance with manufacturer's recommendations.
2. Provide any enclosing or special protection from weather deemed necessary by the Engineer at no additional cost to the Owner.

B. Partial payments under the Contract will not relieve the Contractor from responsibility.

1. When materials and work at the site which have been partially paid for are not adequately protected by the Contractor, such materials will be protected by the

Owner at the expense of the Contractor and no further partial payment thereon will be made.

C. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by the Owner.

D. Storage of PVC pipe:

1. Store in unit packages as received from manufacturer until just prior to use.
2. Stack units in such a manner as to prevent deformation to pipe barrel and bells.
3. Protect from direct sunlight by covering with opaque material if storage period will exceed six weeks.

E. Avoid severe impact blows, gouging or cutting by metal surfaces or rocks.

F. In the event of damage, promptly make replacements and repairs to the approval of the Engineer and at no additional cost to the Owner.

G. Additional time required to secure replacements and to make repairs will not be considered by the Engineer to justify an extension in the contract time of completion.

1.5 ORDER AND ACCEPTANCE OF WORK

A. Engineer shall direct on what line or street the Contractor shall work and the order thereof.

1. Generally, Work shall commence with outfalls, to mains, thence to laterals.

B. Owner reserves right to accept and use any portion of Work whenever it is considered to be in the public interests to do so.

1.6 PROTECTION OF OTHER UTILITIES

A. Location:

1. Approximate location of certain known underground lines is shown.
2. Existing small lines not shown.
3. Locate small and other possible utility lines using electronic pipe finder, or other approved method.
4. Excavate and expose existing underground utilities ahead of trenching operations.

B. Repair or replace any damaged utility line or structure at no additional cost to Owner.

1.7 CONFLICTING UTILITIES

A. Remove and/or relay conflicting utilities, when so directed by the Engineer, at the expense of the Owner.

B. Where alterations to existing utilities are shown to avoid conflicts, make alterations at no cost to Owner.

1.8 JOB CONDITIONS

A. Work under this Section may require construction or work in a confined space, defined as any space having one or more of the following characteristics:

1. Limited openings for entry and exit.
2. Unfavorable natural ventilation.
3. Not designed for continuous worker occupancy.

B. The Contractor shall have on the job site at all times the following minimum safety equipment:

1. Gas monitor capable of testing and detecting for combustible gas, oxygen deficiency and hydrogen sulfide.
2. Confined space access and retrieval winch system.
3. Ventilating fan with large diameter ventilating hose.
4. Supplied air respirator, MISHA/NIOSH approved type.
5. Safety harness and life lines.

This equipment to be available for use by the Contractor, Engineer and Owner for the duration of the project.

C. All entries into or work within confined spaces to be conducted in accordance with the U.S. Department of Health and Human Services/National Institute for Occupational Safety and Health [DHHS (NIOSH)] Publication No. 87-113, A Guide to Safety in Confined Spaces.

PART 2 - PRODUCTS

2.1 GENERAL

A. Pipe shall be subject to Engineer's inspection, at plant, trench or other point of delivery, for culling and rejecting pipe, independent of laboratory tests, not conforming to specifications.

B. Rejected pipe will be marked by the Engineer and Contractor shall remove it from project site.

2.2 PIPE AND FITTINGS

A. Use any pipe material specified herein, except where use of a particular pipe material is indicated on the Contract Drawings.

B. Ductile-iron pipe and fittings (DIP):

1. Comply with ANSI/AWWA C151/A21.51.
2. Use mechanical or push-on joints complying with ANSI/AWWA C111/A21.11 as modified by ANSI/AWWA C151/A21.51.
3. Use rubber gaskets and lubricant complying with ANSI/AWWA C111/A21.10.
4. Use wall thickness class 51 for 4" pipe and class 50 for all other pipe diameters unless class is stated on the plans.

5. Use fittings with pressure rating of 150 psi, complying with ANSI/AWWA C110/A21.10.
6. Use lining complying with one of the following:
   a. Polyethylene lining complying with ANSI/ASTM D-1248, 40 mils nominal thickness or;
   b. Amine cured Novalac Epoxy polymeric lining, 40 mils nominal thickness. The standards of quality are based on Protecto 401 by Vulcan Painters, Birmingham, Alabama or SewerGuard Polymer Lining No. 210 by Sauereisen Cements, Pittsburgh, Pennsylvania.

C. Polyvinyl chloride pipe and fittings (PVC):

1. Use integral wall bell and spigot, minimum of SDR35, complying with ASTM 3034.
2. Use elastomeric gasket joints, providing watertight seal.
3. Furnish pipe in 12.5 or 20 foot lengths.

D. Reinforced concrete pipe, calcareous aggregate:

1. Pipe to conform to the requirements of ASTM Designation C76-90 for Class III, IV or V as required for the maximum trench depths as shown on the plans and specified hereinafter.
2. Manufacture using Type II cement and crushed calcareous coarse aggregate.
3. Furnish pipe of all sizes in minimum lengths of eight (8') feet with a minimum "C" wall thickness.
4. Furnish with rubber o-ring type gasket type joints conforming to ASTM Designation C443-85A.
5. Joint assemblies to be all concrete bell and spigot joint, each utilizing a rubber o-ring gasket as the sole element to seal the joint.
6. Provide a rectangular groove in the spigot end to receive the gasket.
7. The joint assembly shall be so formed and accurately manufactured as to provide a close sliding fit with the gasket confined on all sides.

2.3 MANHOLES

A. Use precast manholes:

1. Provide reinforced precast concrete ring and eccentric cone sections complying with ASTM C478 and the following.
2. Use portland cement complying with ASTM C150, Type II.
3. Cast base slab monolithically with walls.
4. Design flat slab top sections for HS-20 traffic loadings.
5. Cast ladder rungs into the units.
   a. Embed a minimum of 3".
   b. Maximum spacing - 16".
6. Provide tongue and groove with vulcanized butyl rubber sealant or "O" ring rubber gasketed joints.
7. Cast or factory cut pipe opening in manholes:
   a. Provide flexible pipe boot conforming to ASTM C923-02.
   b. Attach boot to piping with dual stainless steel straps.
   c. All other hardware to be stainless steel.

d. Provide Kor-N-Seal or equal.

8. Size lift holes and inserts for a precision fit with the lift devices.
   a. Holes shall not penetrate through the manhole wall.
   b. Comply with OSHA Standard 1926.704.
9. Provide flat slab tops where manhole depth is less than 4'0".
10. Coat manhole with coal tar epoxy, Tnemec "Tneme-Tar" or equal.
   a. Interior 21 dry mils.
   b. Exterior 7 dry mils.[for Manholes below water table]
   c. Do not coat joints.
11. Liner:
   a. Provide a High Density Polyethylene (HDPE) concrete protective liner (CPL) in the pump station wetwells, pressure sewer receiving manholes, the next manhole downstream of receiving manholes, air release valve manholes, drop manholes, and manholes where shown on the plans.
   b. Minimum thickness: 2mm.
   c. Provide extruded liner sheets with a minimum 39 anchoring studs per sq.ft. manufactured during the extrusion process in one piece with the sheet.
   d. Liner pull out of 112.5/lbs/anchoring stud.
   e. Overlap joints with flat liner sheet, non-anchored, having a minimum thickness of 3mm.
   f. Seal all joints by means of thermal welding performed by welders certified by the Manufacturer.
   g. Provide sufficient elongation to bridge up to ¼" settling cracks.
   h. Lining to be repairable at any time during the life of the structure.
   i. Provide a manufacturer-certified fabricator to custom fit the liner to the form work.
   j. Interior surfaces to be protected, including walls, ceiling, pipe entries, and structure chimney.
   k. Manufacture the liner and welding rod from the same resins meeting the following properties:

Property	Testing Method	Unit
Density	ASTM D792-86	.0945 g/cm^3
MFI (Melt Flow Index)	ASTM D1238-88	(190/5) g/10min
Heat Reversion (Dimensional Stability)	ASTM D1638-83	<2%
Yield Stress	ASTM D638-89	,2,320 PSI
Elongation of Yield	ASTM D638-89	,12%
Elongation of Break	ASTM D638-89	,200%
Fire Classification	UL-94	V2
Maximum Working Temperature		140□F

   l. Provide upon request, written certification from the manufacturer that the liner meets or exceeds the requirement of this specification.
   m. Accepted products: AgruSure Grip, or approved equivalent.

B. Steps:

1. Provide polypropylene plastic steps reinforced with ⅜" diameter steel rod, M.S.A. Industries, Inc. Model PS-K, or equal.
2. Provide steps having non-skid top surfaces, safety slope at each end, minimum width of 10" and not less than 5" projection from wall.

C. Exterior joint collar:

1. Install an exterior joint collar on all manhole joints.
2. Provide a 12" wide band.
   a. Provide an outer layer of polyethylene with an under layer of rubberized mastic reinforced with a woven polypropylene fabric.
   b. Provide a peelable protective paper against the mastic that is removed when the collar is applied to the joint.
   c. Design the collar so that when it is applied around the joint the ends overlap at least 6".
3. Provide SealWrap Exterior Joint Sealer as manufactured by Mar-Mac Manufacturing Company or an approved equal.

D. Frames and covers:

1. Provide grey iron castings, complying with ASTM A48, Class 30 iron.
2. Machine all bearing surfaces.
3. Provide frames weighing not less than 208 lbs. with inside opening between 21" and 24".
4. Provide circular cover with two "pick" holes and weighing not less than 120 lbs.
5. Covers to have the words "SANITARY SEWER" cast in the metal.
6. Coat frames and covers with two (2) shop coats of bitumastic paint.
7. Provide watertight covers, where indicated, conforming to above requirements and with frame tapped for four bolts, countersunk in cover.
   a. Provide rubber gasket between frame and cover.
8. Manhole frame and cover to be Sumter Machinery Company Model MC-18 and MF-11.

E. Precast grade rings:

1. Use Precast Grade Rings to adjust ring and covers to finished grade.
2. No more than 8 vertical inches of grade rings will be allowed per manhole.
3. Conform to ASTM C478
4. Provide no less than 4" in height.
5. Use cement brick for adjustments less than 4".

F. Precast inverts:

1. Provide precast inverts.
   a. Pipe openings shall provide clearance for pipe projecting a minimum of 2" inside the manhole.
   b. The height of the transition from the pipe opening to the invert trough shall be equal to one-half of the Opening ID minus Pipe ID, ½".
2. The crown of small I.D. pipe shall be no lower than the crown of the outlet pipe.

a. When the fall between the inlet and the outlet holes is greater than 4", the inlet end of the trough shall be below the inlet pipe invert and aligned horizontally within 1".

b. Form and finish troughs to provide a consistent slope from the pipe outlet to the inlets up to 4" fall.
   1) Minimum fall-1".
   2) Minimum bending radius of the trough centerline-1.5 times the pipe I.D.
   3) Provide a ½" radius at the intersection of 2 or more channels.
   4) The minimum concrete thickness from the bottom of the trough to the bottom of the base shall be 7".

c. Float finish benches to provide a uniform 2" slope, 1", from the high point at the manhole wall to the low point at invert trough.
   1) Provide a ⅜" radius at the edge of the bench and trough.

d. Fill, depressions, high spots, voids, chips, or fractures over ⅛" in diameter or depth with a sand cement paste and finish to a texture reasonably consistent with the formed surface.

2.4 CLEANOUTS

A. Provide cleanouts on each separate service line.

1. Locate within the Owner's right-of-way.

B. Provide Josam, J.R. Smith or equal.

C. Cleanouts shall be the same size diameter as lines in which they are installed and not less than 4".

D. Provide Smith #4253 or Josam #58860, with XH cast iron top.

E. Provide ABS cleanout plugs.

2.5 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 LAYING OUT WORK

A. Provide all materials, labor, instruments, etc. required to lay out Work.

B. Prepare "cut sheets" under direct supervision of the Engineer.

C. Exercise proper precaution to verify figures on the drawings prior to laying out Work. Contractor will be held responsible for any errors therein that otherwise might have been avoided.

D. Promptly inform Engineer of errors or discrepancies found, in order that proper corrections may be made.

3.2 LOCATION

A. Sewer lines in relation to water lines must conform to "Ten State Standards".

B. Where the sewer location is not located clearly by dimensions on the drawings, locate the sewer:

1. Not closer than10' horizontally from a water supply main or service line. The distance shall be measured edge to edge.
2. Where it is not practical to maintain a 10' horizontal separation, the sewer pipe may be installed closer to a water main, provided that the water main is in a separate trench or on an undisturbed earth shelf located on one side of the sewer and at an elevation so the bottom of the water main is at least 18" above the top of the sewer.
3. Where sewers are crossing a water main, either above or below, provide a minimum vertical distance of 18" between the outside of the water main and the outside of the sewer.
4. The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints.
5. Where a water main crosses under a sewer, fully encase the sewer pipe for a distance of 10' on each side of the crossing; or
6. Use acceptable pressure pipe with no joint closer horizontally than 3' feet from the crossing. This pipe will be pressure tested to assure watertightness prior to backfilling.
7. Where concrete encasement is used, provide not less than 4" thickness including that on pipe joints.

3.3 INSTALLATION

A. Trench, backfill and compact for the work of this Section in strict accordance with pertinent provisions of Section 02221 of these specifications, and the following requirements:

1. Maximum trench widths, depths and bedding methods.
   a. Install all sewers complying with tables for depths of cut and class of bedding included hereinafter.
   b. Where trenches are excavated beyond specified widths, or trench walls collapse, lay sewer complying with requirements of the next better class of bedding at no additional cost to the Owner.
   c. Include cost of special bedding and tamping in unit prices bid for sewer.

2. Polyvinyl chloride pipe (SDR35):

MAXIMUM DEPTHS IN FEET			
			CLASS OF BEDDING

		D	C	B	A
PIPE SIZE	MAX. TRENCH WIDTH	FLAT BOTTOM TRENCH	TYPE 1 OR TYPE 2	TYPE 2* ONLY	SPECIAL CONCRETE BEDDING
4"	2'0"	**	**	30	30
8"	2'2"	**	**	30	30
10"	2'4"	**	**	30	30
12"	2'6"	**	**	30	30
15"	2'10"	**	**	30	30
18"	3'2"	**	**	30	30
21"	3'6"	**	**	30	30

* Class B Bedding (Type 2) shall extend to the top of the pipe.

** Do not use this Class of bedding for this pipe size and trench width.

5. Bedding and tamping requirements for the various classes of bedding shall comply with the following specifications:
   a. Class A Bedding - Excavate trench to one-fourth of nominal pipe diameter below pipe grade; lay pipe to grade on concrete blocking; place 2500 psi concrete around pipe for full width of trench up to one-fourth nominal pipe diameter above the invert.
   b. Class B (Type 1) Bedding - Shape bottom of trench to a level 2" below bottom of pipe; bring bed to proper level by spreading and thoroughly tamping fine granulated moist earth and sand to conform accurately to one-fourth circumference of pipe barrel; provide suitable material if not available from trench excavation; lay pipe, backfill and hand tamp in thin layers to height three-fourths of pipe diameter, using material same as bedding material; complete trench backfill complying with Section 02221.
      1) Trenches excavated to excess depths shall be brought to grade with stone or gravel bedding at the Contractor's expense.
      2) Exercise care to avoid disturbing pipe grade, alignment or joints at all times.
      3) In lieu of this class bedding, Contractor may elect to use Class B (Type 2) bedding.
   c. Class B (Type 2) Bedding - Undercut 4" below pipe barrel, full width of trench; bring to grade with compacted crushed stone complying with SCDOT Aggregate No. 5; except for PVC sewers, use SCDOT Aggregate No. 57, then:
      1) For pipe other than PVC, place stone in six inch layers to mid-point of pipe, compacting by slicing with shovel.
      2) For PVC pipe, place stone (Aggregate No. 57) in six inch layers to the top of the pipe, compacting by slicing with shovel.
      3) Complete trench backfill complying with Section 02221.

d. Class C (Type 1) bedding - Shape trench bottom by hand to conform accurately to bottom one-quarter of pipe barrel circumference.
   1) Use Class C (Type 2) bedding if unable to properly shape trench bottom.
   2) If shaping is not performed accurately, the Contractor will be required to use Class C (Type 2) bedding.

e. Class C (Type 2) Bedding - Undercut 4" below bottom of pipe barrel; full width of trench; bring to grade with compacted crushed stone complying with SCDOT Aggregate No. 5; lay pipe; place stone in 6" layers to quarter-point of pipe, compacting by slicing with shovel; complete backfill complying with Section 02221.

f. Class D Bedding - Excavate bell holes in flat bottomed trench; lay pipe; backfill complying with Section 02221.

B. Drain stop:

1. Provide a drain stop at 100' intervals where Class B (Type 2) and Class C (Types 1 and 2) beddings are used.
2. Drain stop to consist of compacted soil 2' in length.
3. Remove water from excavation prior to placing drain stop.

C. Pipe laying:

1. General:
   a. Protect pipe during handling against shocks and free fall. Remove extraneous material from the pipe interior.
   b. Lay pipe by proceeding upgrade with the spigot ends of bell-and-spigot pipe pointing in direction of flow.
   c. Lay each pipe accurately to the indicated line and grade, aligning so the sewer has a uniform invert.
   d. Continually clear interior of the pipe free from foreign material.
   e. Before making pipe joints, clean and dry all surfaces of the pipe to be joined.
   f. Use gasket lubricants as recommended by the pipe manufacturer.
   g. Place, fit, join and adjust the joints to obtain the degree of water tightness required.
2. Polyvinyl chloride pipe:
   a. Select proper bedding class from preceding table as determined by pipe size and depth of cut.
      1) Class B (Type 2) or better bedding shall be used for all PVC sewers.
   b. Comply with ASTM D2321, except as otherwise specified herein.
3. Remove defective pipe and replace with sound pipe, at no cost to the Owner.

3.4 INSTALLATION OF MANHOLES

A. Set bases level so that walls will be plumb.

B. Clean bells and spigots.

C. Apply joint sealer, or ring gasket to wall section(s), set firmly in place to assure watertight joints.

D. Set risers and cones so steps align.

E. Tightly connect pipe boot to piping with dual stainless steel straps.

F. Grout lift holes from the outside using non-shrink grout.

G. Liner installation:

1. Install manhole liner in accordance with manufacturer's published directives and procedures.
2. Perform welding by welders certified by the manufacturer.
3. Complete welding to provide a one-piece monolithic concrete protective liner system.
4. Acceptable welding techniques:
   a. Extrusion welding.
   b. Wedge welding.
   c. Butt welding.
   d. Hot air welding.
5. Perform testing and supervision of the installation and welding by qualified staff only and check when completed by visually checking and by Spark Testing all welded joints.

H. Install exterior joint collar.

1. Follow manufacturer's recommendations.
2. Clean surface.
3. Remove the protective paper and place the band around the manhole, mastic side to the manhole and spanning the joint.
4. Cover exposed strap with the closing flap.

I. Form the invert channels directly in the concrete of the manhole base, with mortar, or by laying full section sewer pipe through the manhole and breaking out the top half after surrounding concrete has hardened. Smooth the floor of the manhole outside the channels, and slope toward the channels at not less than 1" per foot nor more than 2" per foot.

1. Shape the invert channels to be smooth and semi-circular, conforming to the inside of the adjacent sewer section.
2. Make changes in direction of flow with a smooth curve of as large a radius as the size of the manhole will permit.
3. Make changes in size and grade of channels smoothly and evenly.
4. Slope invert uniformly from invert of inlet to invert of outlet.

J. Install manhole to grade utilizing precast grade rings.

3.5 DROP MANHOLES

A. Where indicated, or as directed by the Engineer, construct drop manhole connections, complying with plan details.

3.6 CONNECTIONS TO EXISTING SYSTEM

A. Construct new manhole as specified, breaking upper half of existing pipe after base of manhole is completed so as not to obstruct flow of the existing pipe.

B. At existing manhole tie-ins, temporarily block and/or divert sewage flows, perform other miscellaneous work.

1. Use high-early strength cement for mortar, forming proper channels with minimum interruption to service of the existing sewer.

3.7 INSTALLATION IN CASING PIPES

A. Install sewer where indicated within a casing pipe complying with Section 02780 of these specifications.

3.8 SERVICE LINES

A. Connect to street sewers using wye branches and ells as indicated on the plans.

B. Do not stack service lines vertically over the sewer main.

3.9 CLEANOUTS

A. Secure the Engineer's approval of locations for cleanouts in finished areas prior to installation.

B. Pour 4" concrete protection pad around cleanout.

3.10 INSPECTIONS AND TESTING

A. General:

1. All sewers will be visually inspected, tested and gauged for infiltration and/or exfiltration.
2. All visible leaks shall be repaired even if infiltration is within allowable limits.
3. Broken or cracked pipe, mislaid pipe and other defects shall be corrected.
4. All repairs, relaying of sewers, etc., required to bring the sewers to specified status shall be made at no additional cost to the Owner.
5. Expense of all testing will be borne by the Contractor.

B. Inspection:

1. Clean and prepare for inspection each block or section of sewer upon completion, or at such other time as the Engineer may direct.
2. Each section between manholes shall show a full circle of light when viewed from either end.

C. Deflection tests:

1. Perform deflection tests on all PVC pipe in the presence of the Engineer.
2. No pipe to exceed a deflection of 5%.
3. Conduct deflection testing after the final backfill, and compaction thereof, has been in place at least thirty (30) days and prior to placing the sewer lines into operation.
4. Conduct the deflection tests using a rigid ball or mandrel having a diameter equal to 95% of the inside diameter of the pipe.
5. Do not use mechanical pulling devices for the deflection tests.

D. Infiltration tests:

1. Conduct tests using V-notch weir, or by direct measurement prior to allowing sewage flows in the line.
2. Close the end of the sewer at upstream structure sufficiently to prevent the entrance of water.
3. Discontinue use of well points or other groundwater pumping operations at least three days prior to testing.
4. Infiltration into the entire system of new sewers or any one trunk, interceptor or outfall sewer, including connecting laterals, or any stretch of sewer shall not exceed:
   a. 200 gallons per inch of diameter per mile per day.
5. Make tests in presence of the Engineer, giving the Engineer at least three days advance notice.

E. Air testing:

1. Where sewers are installed above the groundwater table, conduct air tests complying with applicable section of ASTM C828 for ductile iron and ASTM 924 for concrete pipe and ASTM F1417 for PVC pipe.

F. Manhole Testing

1. Manholes shall be true circles of acceptable concrete with properly corbeled tops, satisfactory inverts and properly placed steps and castings. Manholes shall not show evidence of leakage.

2. All manholes shall be vacuum tested to determine the presence of damaged or faulty installation. The Contractor will furnish all facilities, personnel, and equipment needed for conducting the test. The acceptance vacuum test shall be made after backfilling has been completed and will be in the presence of the OWNER'S Inspector. The test will be performed as follows:

   Plug all manhole entrances and exits other than the manhole top access using suitably sized pneumatic or mechanical pipeline plugs and follow all manufacturers' recommendations and warnings for proper and safe installation of such plugs.

   Install the vacuum tester head assembly at the top access of manhole.

   Evacuate the manhole to 10" hg. (Approximately negative 5 psig, 0.3 bar).

Close vacuum inlet/outlet ball valve and monitor vacuum for one minute. If vacuum does not drop in excess of 1" Hg., manhole is considered acceptable and the manhole passes the test. If manhole fails the test, complete necessary repairs and repeat test procedures until satisfactory results are obtained.

END OF SECTION

SECTION 02723
SEWERS: SANITARY, PRESSURE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide sanitary sewer pressure (force) mains as shown on the drawings, specified herein, and needed for a complete and proper installation.

B. Related work:

1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 02221 - Trenching, Backfilling for Utilities.
3. Section 02615 - Removing and Replacing Pavements.
4. Section 02930 - Grassing.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. All materials in this Section are to be manufactured in the United States.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Materials list of items proposed to be provided under this Section.
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01640.

B. Storage of pipe:

1. Store in unit packages as received from manufacturer until just prior to use.
2. Stack units in such manner as to prevent deformation to pipe barrel and bells.
3. Protect from direct sunlight by covering with opaque material if storage period will exceed six weeks.

C. Avoid severe impact blows, gouging or cutting by metal surfaces or rocks.

PART 2 - PRODUCTS

2.1 GENERAL

A. Use any pipe material and associated fittings as specified herein, except where use of a particular material is indicated on the plans, or specified herein.

2.2 PIPE AND FITTINGS

A. Ductile-iron pipe and fittings (DIP):

1. Comply with ANSI/AWWA C151/A21.51.
2. Use mechanical or push-on joints complying with ANSI/AWWA C111/A21.11 as modified by ANSI/AWWA C151/A21.51.
3. Use rubber gaskets and lubricant complying with ANSI/AWWA C111/A21.10.
4. Use wall thickness Class 53 for all DIP within the limits of the pump station. Use wall thickness Class 51 for all DIP outside the pump station limits.
5. Use fittings with pressure rating of 150 psi, complying with ANSI/AWWA C110/A21.10.
6. Use lining complying with one of the following:
   a. Polyethylene lining complying with ANSI/ASTM D-1248, 40 mils nominal thickness or;
   b. Amine cured Novalac Epoxy polymeric lining, 40 mils nominal thickness. The standards of quality are based on Protecto 401 by Vulcan Painters, Birmingham, Alabama or Corrosion-Clad Polymer Lining No. 210 by Seauereisen Cements, Pittsburgh, Pennsylvania.

B. Polyvinyl chloride pipe and fittings (PVC):

1. Use integral wall bell and spigot, minimum of DR25, complying with ANSI/AWWA C900.
2. Use elastomeric gasket joints, providing watertight seal (ASTM D3139).
3. Furnish pipe in standard mill lengths.

2.3 AIR RELEASE AND VACUUM VALVES

A. Provide air release valves at locations indicated on the drawings and not specified in other sections of these specifications. Provide ARI Flow Control Accessories Model D-020 Combination Air Valve for Sewage, or approved equal, at location closest to pump station. Provide ARI Flow Control Accessories Model D-025 Combination Air Valve for Sewage, or approved equal, at all other locations.

B. Raw wastewater, unfiltered wastewater effluent, and sludge applications:

1. Provide single body universal type with rolling seal mechanism to seal both the pressure orifice and the air and vacuum orifice simultaneously.
   a. Design valve to automatically exhaust large amounts of air and gases while the pipeline or system is being filled and close after the system is purged of air.
   b. Design valve to re-open to admit air during draining or when a negative pressure exists in the system.
   c. Valve body and internal components shall be made of non-corrosive materials. No cast iron will be allowed.
2. Provide valve with minimum 2" inlet, or larger if shown on the drawings.
3. Design valve with conical shape to allow mimimum contact between operating mechanisms and sewage.
   a. Provide internal linkage and float of stainless steel or polyproplyene.
   b. Provide a Type 316 stainless steel plug and removable Type 316 stainless steel seat ring in a ductile iron cage.
   c. Provide plug with a renewable resilient O-ring seat of Buna-N or other suitable material retained in a dovetail groove.
   d. Provide a single float ball or 18-8 stainless steel or polypropylene, attached to a stainless steel stem by means of a universal connection.
4. Provide body and cover constructed of 316 stainless steel or reinforced nylon.
5. Provide camlock fitting for back flush attachment.
6. Provide complete with 1" blowoff stainless steel ball valve.

7. Valve shall close at 3 psi working pressure.
8. All piping, nipples, plugs etc., to be Schedule 40, Type 316 stainless steel or PVC.
9. Valves to be a maximum of 24" in overall height fo minimixe contact between the liquid and the linkage and orifice areas.
   a. Short body valves may be allowed where insufficient space is available, and as indicated in the drawings or this specification.
   b. Short body valves to be a maximum of 19" in overall height.

2.4 METALLIC DETECTION TAPE

A. Provide 2" wide metallic detection tape on all buried non-metallic piping.

1. Provide 5.0 mil overall thickness with no less than a 50-gauge solid aluminum foil core.
2. Foil to be visible from both sides.
3. No inks or printing extended to the edges of the tape.
4. Encase printing to avoid ink rub-off.
5. Tensile strength - 28 lbs/inch.
6. Use heat set mylar inks.

B. Locate 12" below ground surface in pipe trench.

C. Color to be safety brown.

D. Wording on tape to indicate pipe contents and repeated a minimum of every 24".

2.5 CONCRETE

A. Use 3000 psi complying Notes on Drawing 38004-S01.

PART 3 - EXECUTION

3.1 HANDLING

A. Handle pipe accessories so as to ensure delivery to the trench in sound, undamaged condition:

1. Carry pipe into position - do not drag.
2. Use pinch bars or tongs for aligning or turning pipe only on the bare end of the pipe.
3. Use care not to injure pipe linings.

B. Thoroughly clean interior of pipe and accessories before lowering pipe into trench. Keep clean during laying operations by plugging or other method approved by the Engineer.

C. Before installation, inspect each piece of pipe and each fitting for defects:

1. Material found to be defective before or after laying: Replace with sound material meeting the specified requirements, and without additional cost to the Owner.

D. Rubber gaskets: Store in a cool dark place until just prior to time of installation.

3.2 PIPE CUTTING

A. Cut pipe neatly and without damage to the pipe.

B. Unless otherwise recommended by the pipe manufacturer and authorized by the Engineer, cut pipe with mechanical cutter only.

1. Use wheel cutters when practicable.
2. Cut plastic pipe square, and remove all burrs.

3.3 LOCATING

A. Where possible, locate pressure sewer at least 10' away, horizontally, from water mains.

B. Where pressure sewers cross over or under water lines, maintain minimum 18" separation between outside edges of the two pipes.

1. A full length of the pressure sewer pipe shall be located so that the joints will be equal distance from the water main.

3.4 EXCAVATION AND BACKFILLING

A. Comply with pertinent provisions of Section 02221 of these Specifications.

3.5 ALIGNMENT OF PIPE

A. Pipe lines intended to be straight shall be so laid.

B. Where vertical or horizontal alignment requires deflection from straight line or grade, such deflection shall not exceed maximum deflection recommended by the pipe manufacturer.

C. If alignment requires deflection exceeding recommended limits, furnish special bends or a sufficient number of shorter lengths of pipe to provide angular deflections within the allowable limits.

3.6 PLACING AND LAYING

A. General:

1. Lower pipe and accessories into trench by means of derrick, ropes, belt slings, or other equipment approved by the Engineer.
2. Do not dump or drop any of the materials of this Section into the trench.
3. Rest the full length of each section of pipe solidly on the pipe bed, with recesses excavated to accommodate bells, couplings, and joints.
4. Take up and relay pipe that has the grade or joint disturbed after laying.
5. Do not lay pipe in water, or when trench conditions are unsuitable for the work; keep water out of the trench until jointing is completed.
6. Securely close open ends of pipe when work is not in progress.
7. Where any part of coating or lining is damaged, repair to the approval of the Engineer and at no additional cost to the Owner.

3.7 INSTALLATION OF MANHOLES

A. Set bases level so that walls will be plumb.

B. Clean bells and spigots.

C. Apply joint sealer, or ring gasket to wall section(s), set firmly in place to assure watertight joints.

D. Set risers and cones so steps align.

E. Tightly connect pipe boot to piping with dual stainless steel straps.

F. Grout lift holes from the outside using non-shrink grout.

G. Install exterior joint collar.

1. Follow manufacturer's recommendations.
2. Clean surface.
3. Remove the protective paper and place the band around the manhole, mastic side to the manhole and spanning the joint.
4. Cover exposed strap with the closing flap.

H. Form the invert channels directly in the concrete of the manhole base, with mortar, or by laying full section sewer pipe through the manhole and breaking out the top half after surrounding concrete has hardened. Smooth the floor of the manhole outside the channels, and slope toward the channels at not less than 1" per foot nor more than 2" per foot.

1. Shape the invert channels to be smooth and semi-circular, conforming to the inside of the adjacent sewer section.
2. Make changes in direction of flow with a smooth curve of as large a radius as the size of the manhole will permit.
3. Make changes in size and grade of channels smoothly and evenly.
4. Slope invert uniformly from invert of inlet to invert of outlet.

I. Install manhole to grade utilizing precast grade rings.

3.8 JOINT RESTRAINT

A. Provide restrained joint pipe and fittings, as indicated in the plans, at each change of pipe direction as shown in the Joint Restraint Schedules below.

8" DIP pipe

Angle α	Restrained Length
11 ¼°	3'
22 ½°	5'
45°	10'
90°	23'

6" DIP pipe

Angle α	Restrained Length
11 ¼°	2'
22 ½°	4'
45°	8'
90°	18'

8" PVC pipe

Angle α	Restrained Length
11 ¼°	4'
22 ½°	7'
45°	14'
90°	32'

6" PVC pipe

Angle α	Restrained Length

11 ¼°	3'
22 ½°	5'
45°	11'
90°	25'

B. Ductile iron pipe (DIP):

1. Provide retainer glands for use with mechanical joint pipe and fittings.
2. Provide wedge type.
3. Provide ductile iron gland conforming to ASTM A536-80. Provide split gland where standard gland cannot be installed.
4. Provide ductile iron set screws, heat treated to a minimum hardness of 370 BHN with twist-off nuts and permanent standard hex head remaining.
5. Provide for the following rated pressure with minimum 2 to 1 safety factor; 3" - 16" 350 psi, 18" - 48" 250 psi.
6. Provide tee-head bolts conforming to ANSI/AWWA C111/A21.11 latest revision.
7. Provide "MEGALUG" as manufactured by EBAA Iron Sales, Inc. of Eastland, Texas, or approved equal.

C. Polyvinyl Chloride pipe (PVC):

1. Provide restraint for C900 PVC by mechanical means separate from the mechanical joint gasket sealing gland.
   a. Provide wide, supportive contact around full pipe circumference as follows:

Size	Restraint Width
4", 6"	1½"
8", 10", 12"	3"

   b. Provide means of restraint by machined serrations on inside surface of restraint device designed to provide circumferential loading over the entire restrainer.
      (1) Design to be such that restraint increases with increased in-line pressure.
      (2) Provide a minimum of 8 serrations per inch of restraint width.
   c. Restraint device to be pressure rated at 350 psi, or equal to the pipe on which it is used and capable of withstanding test pressures of 2 times pressured rating.
   d. Finish fushion applied epoxy coating per AWWA C-213.
2. Provide "MEGALUG" as manufactured by EBAA Iron Sales, Inc. of Eastland, Texas, or approved equal.

3.10 HYDROSTATIC TESTING

A. General:

1. Clean and flush line of dirt and foreign material.
2. Do not perform hydrostatic tests until at least five days after installation of concrete thrust blocking.
3. Test pump, pipe connection, pressure gauges, measuring devices and all other necessary apparatus to conduct tests shall be provided by the Contractor.
4. Provide temporary plug and blocking at open ends.

B. Leakage test:

1. Duration of each test: At least 2 hours.
2. During the test, subject pressure sewer lines to a hydrostatic pressure of 100 psi.
3. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved or approved section thereof, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.

   a. No piping installation will be accepted until the leakage is less than the number of gallons per hour as determined by the formula:
   L = 0.000007 SD x square root of P; where
   L = allowable leakage in gallons per hour;
   S = length of pipe tested in feet;
   D = nominal diameter of pipe in inches; and
   P = average test pressure in lbs per square inch gauge.

   b. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gallons per hour per inch of nominal valve size will be allowed.

   c. Should any test of pipe disclose leakage greater than that specified above, locate and repair the defective joint or joints until the leakage is within the specified allowance, and at no additional cost to the Owner.

3.11 MEASUREMENT AND PAYMENT

A. All work under this Section will be included in the lump sum item.

END OF SECTION

SECTION 02780
CASING PIPES FOR UTILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide and install casing pipes under surface structures, where indicated, as specified herein, and as needed for a complete and proper installation.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.

1.3 SUBMITTALS

A. Required data to be submitted to the Engineer in triplicate.

B. Product data: Within _30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.4 PRODUCT HANDLING

A. General:

1. Carefully and properly protect all materials of every description, both before and after being used in the Work in accordance with manufacturer's recommendations.
2. Provide any enclosing or special protection from weather deemed necessary by the Engineer at no additional cost to the Owner.

B. Partial payments under the Contract will not relieve the Contractor from responsibility.

1. When materials and work at the site which have been partially paid for are not adequately protected by the Contractor, such materials will be protected by the Owner at the expense of the Contractor and no further partial payment thereon will be made.

C. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by the Owner.

D. Storage of casing pipe:

1. Store in unit packages as received from manufacturer until just prior to use.

E. Avoid severe impact blows, gouging or cutting by metal surfaces or rocks.

F. In the event of damage, promptly make replacements and repairs to the approval of the Engineer and at no additional cost to the Owner.

G. Additional time required to secure replacements and to make repairs will not be considered by the Engineer to justify an extension in the contract time of completion.

PART 2 - PRODUCTS

2.1 CASING PIPE FOR DRY BORES

A. Steel complying with ASTM A139 for Grade B with minimum yield strength of 35,000 psi.

B. Provide ends suitable for field welding.

C. Minimum wall thickness as follows:

Diameter of Casing (Inches)	Minimum Wall Thickness (Inches)
6 thru 14	1/4
16 and 18	5/16
20 and 22	3/8
24 and 26	7/16
28 thru 32	1/2
34 thru 42	9/16
44 thru 48	5/8
50 thru 54	3/4

2.2 PIPELINE CASING SPACERS

A. For piping installed in casing provide pipeline casing spacers.

B. Provide a minimum of 1 spacer per ten linear feet of pipe for ductile iron pipe and a minimum of 1 spacer per six linear feet for PVC pipe.

C. Provide spacer with shell of 14 gauge T-304 stainless steel.

D. Provide shell liner of .090" thick PVC, 85-90 durometer.

E. Provide 5/16" stainless steel connecting bolts and lock nuts, minimum three (3) per flange.

F. Runners from 2" wide ultra high molecular weight polymer with a high resistance to abrasion and a coefficient of friction of 0.11 -0.13 in accordance with ASTM D-1894.

G. Support runners on 14 gauge reinforced T-304 stainless steel risers welded to shell.

H. All metal surfaces to be fully passivated.

I. The diameter as measured over the runners shall exceed the pipeline bell or coupling outside diameter.

J. Provide pipeline casing spacers as manufactured by Cascade Manufacturing, Pipeline Seal and Insulator, Inc. or approved equal.

2.3 END SEALS

A. Provide 1/2" thick rubber end seal to seal each end of the casing.

B. Secure to casing and carrier pipe with T-304 stainless steel bands.

C. Acceptable manufacturers: Cascade Manufacturing, Pipeline Seal and Insulator, Inc. or approved equal.

PART 3 - EXECUTION

3.1 ENTRY PITS

A. Locate to avoid interference with traffic, adjacent structures, etc. to such extent possible.

B. Excavate to required depth, providing sheeting and shoring necessary for protection of the Work and for safety of personnel.

C. Maintain in dry condition by use of pumps, drains or other approved method.

3.2 INSTALLATION

A. Install casings by dry-boring through the casing while simultaneously jacking the casing.

B. Any proposed alternate method shall be approved in writing by the Engineer.

C. Weld joints to provide a watertight joint.

D. Casings for gravity sanitary sewer, storm drainage or shown to be installed to grade, shall not vary more than 3/32" per foot of length from the indicated grade.

1. Remove and replace any improperly installed or otherwise defective casing at no additional cost to the Owner.

3.3 INSTALLING PIPE IN CASING

A. General:

1. Inspect carefully, insuring that all foreign material is removed from the casing and the casing meets alignment criteria for the type of carrier pipe being used.
2. For pressure systems, the casing deflection shall not exceed the maximum deflection recommended by the carrier pipe.
3. Install casing spacers on the carrier pipe per the manufacturer's instructions.
4. For sanitary and storm sewer provide spacer sizing and length necessary to obtain the pipe slope and elevations as shown on the plans.
5. Provide centered or restrained configuration.
6. Install the carrier pipe in the casing insuring each joint is pushed "home" before the joint is installed into the casing.

3.4 CASING ENDS

A. Install rubber end seals in accordance with manufacturer's instructions.

END OF SECTION

SECTION 03405
PRECAST UTILITY VAULT

PART 1. GENERAL

1.1 DESCRIPTION

A. Work included: Provide precast concrete utility vaults where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

2. Section 03300: Cast-in-Place Concrete.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Qualifications of manufacturer: Demonstrate capability to make and provide the specified quality products by attestation of the Prestressed Concrete Institute under the Plant Certification Program.

C. Referenced manufacturer is Tindall Concrete Products, Inc. Equal precast vaults of other manufacturers conforming to these specifications may be provided with the Engineer's approval.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Materials list of items proposed to be provided under this Section.

2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

3. Manufacturer's certifications and laboratory test reports required.

4. Shop drawings, prepared in accordance with pertinent provisions of Section 01340 of these Specifications and showing complete information for fabrication and erection of the work of this Section including, but not necessarily limited to:

a. Member dimensions and cross sections; locations, size and type of reinforcement, including special reinforcement and lifting devices necessary for handling and erection.

b. Erection procedures, sequence of erection, and required handling equipment.

c. Layout, dimensions, and identification of each precast unit corresponding to the sequence and procedure of installation.

d. Details of inserts, connections, and joints, including accessories and construction at openings in the precast units.

e. Location and details of anchorage devices that are to be embedded in other construction.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01640.

B. Delivery, storage and handling:

1. Deliver the work of this Section to the job site in such quantities and at such times as to assure the continuity of construction.

2. Store units at the job site in a manner to prevent cracking, distortion, warping, staining and other physical damage, and in a manner to keep markings visible.

3. Lift and support the units only at designated lifting points or supporting points as shown on the approved Shop Drawings.

PART 2. PRODUCTS

2.1 DESIGN

A. Construct vault according to the dimensions as shown on the plans.

B. Modification:

1. Provide complete design, calculations, and drawings as called for under Article 1.3 above.

2. Maintain the general design concept as shown, without decreasing or increasing sizes of members and without altering profiles and alignment, except as approved by the Engineer.

3. Make necessary provisions in the design to accommodate stress to be encountered.

C. Standards:

1. Products shall meet the requirements of ASTM C478 or ASTM C913.

2. Design in accordance with pertinent recommendations contained in:

a. ACI 301.

b. ACI 304.

c. ACI 311.

d. ACI 318.

e. ACI 347.

f. CRSI "Manual of Standard Practice".

g. PCI 116.

3. Comply with requirements of governmental agencies having jurisdiction.

4. In the event of conflict between or among standards, the more stringent provision shall govern unless directed otherwise by the Engineer.

2.2 REINFORCEMENT AND CONNECTION MATERIALS

A. Provide reinforcement, accessories, and connection materials required in accordance with the final design as approved by the Engineer.

B. Standards:

1. Meet or exceed the quality specified for similar materials under other Sections of these Specifications.

2. For materials not specified under other Sections of these Specifications, but required for a complete and proper installation, provide new materials, first quality of their respective kinds, as selected by the Contractor subject to the approval of the Engineer.

2.3 CONCRETE

A. Design strength:

1. Unless otherwise indicated on the Drawings or approved by the Engineer, design the mix and proportion the concrete to attain a minimum compressive strength of 5000 psi when cured and tested at 28 days in accordance with ASTM C39.

2. Reinforcing steel to meet requirements of ASTM A615, Grade 60.

2.4 JOINT SEALANT

A. Provide a vulcanized butyl rubber sealant of adequate size and quantity to seal joints in the precast vault risers.

2.5 FABRICATION

A. General:

1. Vault to be monolithically poured.
2. Fabricate the work of this Section to the sizes and shapes indicated.
3. Provide finished units that are straight, true to size and shape, and within the specified casting tolerances.
4. Make exposed edges sharp, straight, and square. Make flat surfaces into a true plane.
5. Warped, cracked, broken, spalled, stained and otherwise defective units will not be acceptable.
6. Place and secure in the forms all anchors, clips, stud bolts, inserts, lifting devices, shear ties, and other devices required for handling and installing the precast units and for attachment of subsequent items as indicated or specified.
7. Cast ladder rungs into the units.
8. Provide tongue and groove joints.
9. Provide polypropylene plastic steps reinforced with □" diameter steel rod, M.S.A. Industries, Inc. Model PS-K or equal.

B. Curing:

1. Form cure the work of this Section for a minimum of 20 hours.
2. Keep wet continuously for not less than six (6) days after being removed from the forms.
3. Following the curing period, allow the units to air dry for at least four (4) days before being shipped.

C. Casting tolerances: Maintain casting, bowing, warping, and dimension tolerances with the following maximums:

1. Overall dimension for height and width of units:
   a. Plus zero of unit dimension to minus 3/32" for 10'0" and over.
2. Make thickness of units □" maximum.
3. Bowing or warping:
   a. Do not exceed 1/360 of the span.
4. Insert locations:
   a. Place within □" in each direction.
5. Opening dimensions to figured dimensions:

a. Accurate within a tolerance of plus □" to minus zero.

2.6 LINER

A. Where indicated on the plans provide a polyethylene liner in precast vaults.

1. 1. Provide a High Density Polyethylene (HDPE) concrete protective liner (CPL) in the pump station wetwells, pressure sewer receiving manholes, the next manhole downstream of receiving manholes, air release valve manholes, drop manholes, and manholes where shown on the plans.

2. Minimum thickness: 2mm.

3. Provide extruded liner sheets with a minimum 39 anchoring studs per sq.ft. manufactured during the extrusion process in one piece with the sheet.

4. Liner pull out of 112.5/lbs/anchoring stud.

5. Overlap joints with flat liner sheet, non-anchored, having a minimum thickness of 3mm.

6. Seal all joints by means of thermal welding performed by welders certified by the Manufacturer.

7. Provide sufficient elongation to bridge up to □" settling cracks.

8. Lining to be repairable at any time during the life of the structure.

9. Provide a manufacturer-certified fabricator to custom fit the liner to the form work.

10. Interior surfaces to be protected, including walls, ceiling, pipe entries, and structure chimney.

11. Manufacture the liner and welding rod from the same resins meeting the following properties:

Property	Testing Method	Unit
Density	ASTM D792-86	0.0945 g/cm^3
MFI (Melt Flow Index)	ASTM D1238-88	(190/5) g/10min
Heat Reversion (Dimensional Stability)	ASTM D1638-83	<2%
Yield Stress	ASTM D638-89	2,320 PSI
Elongation of Yield	ASTM D638-89	12%
Elongation of Break	ASTM D638-89	200%
Fire Classification	UL-94	V2
Maximum Working Temperature		140°F

12. Provide upon request, written certification from the manufacturer that the liner meets or exceeds the requirement of this specification.

13. Accepted products: AgruSure Grip, or approved equivalent.

PART 3. EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 COORDINATION

A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

3.3 INSTALLATION

A. Install the work of this Section in strict accordance with the original design, the approved Shop Drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Engineer, anchoring all components firmly into position for long life under hard use.

B. Set bases level so that walls will be plumb.

C. Apply joint sealer or ring gasket to wall section(s), set firmly in place to assure watertight joints.

D. Powder actuated fasteners:

1. Do not use powder actuated fasteners for surface attachment of accessory items except as specifically approved by the Engineer and specifically accepted by the precast unit manufacturer.

E. Liner installation:

1. Install manhole liner in accordance with manufacturer's published directives and procedures.

2. Perform welding by welders certified by the manufacturer.

3. Complete welding to provide a one-piece monolithic concrete protective liner system.

4. Acceptable welding techniques:

   a. Extrusion welding.

   b. Wedge welding.

   c. Butt welding.

   d. Hot air welding.

5. Perform testing and supervision of the installation and welding by qualified staff only and check when completed by visually checking and by Spark Testing all welded joints.

3.4 FINISH

A. Comply with pertinent provisions of Section 03300 for cast-in-place concrete.

3.5 MEASUREMENT AND PAYMENT

A. No separate measurement or direct payment will be made for the work under this Section and all costs for same shall be included in the price bid for the item to which it pertains.

END OF SECTION

SECTION 11293
PLUG VALVES

PART 1. GENERAL

1.1 DESCRIPTION

A. Work included: Provide plug valves at all locations indicated on the Drawings, and as specified herein, complete and ready for operation.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Referenced manufacturer is DeZurik and is named to establish standards of quality. Equal products of other manufacturers conforming to these specifications may be provided upon approval by the Engineer.

C. Manufacturers to have a minimum of ten (10) years operating experience for the specified valve.

D. Provide valves with castings and all other components manufactured in the United States.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Materials list of items proposed to be provided under this Section.

a. Provide listing of all valves to be provided and include type of valve and location.

2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

3. Shop drawings showing sectional views, dimensions, end connections, and operator details.

4. Provide Maintenance manuals complying with provisions of Section 01650.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01640.

PART 2. PRODUCTS

2.1 GENERAL

A. Provide non-lubricated, eccentric type plug valves having resilient faced plugs, complying with AWWA Standard C504 and other requirements specified herein.

B. Furnish screwed, flanged or mechanical joint end connections as indicated on the Drawings.

C. Provide valves of bolted bonnet design:

1. Valves 4" and larger to be designed to allow repacking without removing the bonnet or actuator and the packing shall be adjustable.

2. Packing to be replaceable with the valve under pressure with valve open or closed with pressure on either side of the plug.

D. Provide valves capable of drip-tight shutoff up to full rating with pressure in either direction. Pressure ratings shall be 175 psi for 4" through 12", 150 psi for 14" through 36", and 125 psi for 42" and larger.

E. Valve bodies shall be cast iron complying with ASTM A126, Class B and AWWA Standard C-504-80, Section 5.4.

F. All exposed nuts, bolts, springs, etc. shall be stainless steel on all valves.

2.2 PORT AREAS

A. Four inch through twenty inch valves, not less than 80% of full pipe area.

B. Twenty-four inch and larger, not less than 70% of full pipe area.

1. Port to be smoothly shaped with an unobstructed waterway when open.

2.3 SEATS

A. Provide corrosion resistant seats complying with AWWA Standard C507-73 and AWWA Standard C504.

B. Three inch and larger valves to have a □" thick hand welded-in overlay of not less than 90% nickel content on all surfaces contacting the plug face.

1. Seat to be raised □" from the valve body and machined to a smooth finish.

C. Screwed in or bolted in seats are not acceptable.

2.4 BEARINGS

A. Provide valves through twenty inch size with permanently lubricated, Type 316 stainless steel bearings in the upper and lower plug stem journals.

B. Provide 24" and larger valves with bronze bearings and stainless steel sleeves in the upper and lower plug stem journals.

C. Bearings to comply with AWWA Standard C507-73 and AWWA Standard C504.

D. Lower bearing housing to be raised from the body to reduce the possibility of grit and sand entering the bearing housing.

2.5 FLANGED END CONNECTIONS

A. Provide, where indicated, valves with flanged ends, faced and drilled to ANSI 125/150 lb. standard.

B. Flanged valves through 12" to have face-to-face dimensions of AWWA standard gate valves.

2.6 RESILIENT PLUG FACING

A. Provide neoprene plug facings vulcanized to the plug and suitable for use with domestic wastewater.

B. Plug to be one piece with integral stem through the actuator.

C. Do not use plugs with cast inlays.

2.7 BURIED SERVICE VALVES

A. Provide seals on all shafts and gaskets on valve covers to prevent entry of water and dirt.

2.8 PRESSURE GAUGE TAPS

A. Provide □" tap with plug on both ends of the valve for pressure gauge connections.

2.9 ACTUATORS

A. Manual valves to be provided with lever or gear actuators and tee wrenches, extension stems, floor stands, chainwheels, etc. as indicated on the Drawings.

1. Provide a lever for each lever operated valve.

2. Provide one tee wrench for every five valves utilizing the tee wrench operation.

B. Valves furnished for installation in a valve box to be provided with a 2" square operating nut and extension within 18" of the top of the valve box.

C. Provide 4" and larger valves with gear actuators.

1. Provide gear to fit on hexagonal valve shaft to allow operation without the use of roll pins.

    a. Adaptor between plug shaft and actuator shaft is not acceptable.

2. Handwheel and chainwheel components between the input and the stop-limiting devices to be designed to withstand, without damage, a pull of 200 lbs. as required by the American Water Works Association (AWWA) Standard C504-74 Section 11.2.3.

3. Pulley and chain for chainwheel actuators to be hot-dipped galvanized unless otherwise noted on the plans.

4. Gear sector to handwheel diameter ratio not to exceed 2:1.

5. Provide spring loaded U-cup seals on gear sector of gear box housing.

    a. Do not provide o-ring seals.

6. Gear actuators, normal service:

    a. Enclose all gearing in a semi-steel housing suitable for running in a lubricant with seals provided on all shafts to prevent entry of dirt or water into the actuator.

    b. Support actuator shaft and quadrant on permanently lubricated bronze bearings.

    c. Provide valve position indicator and an adjustable stop to set closing torque.

    d. All exposed nuts, bolts and washers to be stainless steel.

    e. Provide air gap between the actuator and the valve body to prevent leakage from the valve into the actuator.

7. Gear actuators, buried service:

    a. Provide neoprene seals on all shafts and gaskets on actuator covers to prevent entry of water and dirt.

    b. Mounting brackets to be totally enclosed with gasket seals.

    c. Support actuator shaft and quadrant on permanently lubricated bronze bearings.

    d. All exposed nuts, bolts and washers to be stainless steel.

PART 3. EXECUTION

3.1 GENERAL

A. Handle, store and install all valves complying with the manufacturer's recommendations and the Drawings.

B. Valves installed in horizontal pipe runs shall be mounted with the plug horizontal and at the top of the body when the valve is open.

3.2 PAINTING

A. Exposed valves:

1. Factory painting:

a. Sandblast to SSPC-10 Near White Metal.

b. Prime exterior with Tnemec 66-1211 Epoxoline Primer, 3.0 dry mils.

c. Paint interior of valve with two coats of coal tar epoxy, minimum 14 mils dry thickness.

2. Field painting:

a. Comply with pertinent provisions of Section 09900.

B. Buried valves:

1. Sandblast to SSPC-10 Near White metal.

C. Paint exterior and interior of valve with two coats of coal tar epoxy, minimum 14 mils dry thickness.

3.3 MEASUREMENT AND PAYMENT

A. No separate measurement or direct payment will be made for the work under this Section and all costs for same shall be included in the price bid for the item to which it pertains.

END OF SECTION

SECTION 11313
SUBMERSIBLE SEWAGE PUMPS

PART 1. PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide submersible sewage pumps for one triplex sewage lift station, each station including, but not necessarily limited to, three submersible sewage pumps, guide rail mounting system, guide rails, wetwell access, discharge seal and elbow, jib crane, jib crane sockets, and motor control center with liquid level control system, to provide station complete and ready for operation. Initial installation will be two pumps operating in duplex mode with one spare pump.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 01650 - General Equipment Requirements.
3. Section 16400 - Electrical.

1.2 QUALITY ASSURANCE

A. Referenced manufacturer is Ebara and is named to establish standards of quality. Equal products of other manufacturers meeting all requirements of this specification may be provided upon approval by the Engineer.

B. The Contractor's attention is directed to the fact that the pumps and controls are an integrated system in the view of the Engineer and as such shall be furnished by one vendor who shall provide all the equipment and appurtenances regardless of the manufacture, and be responsible to the Contractor for satisfactory operation of the total system.

C. The pump manufacturer shall have a minimum of 1,000 pumping units of similar type pumps, installed and operating for not less than five (5) years in the United States.

D. Technical services:

1. Provide a service engineer, complying with requirements of Section 01660 for the following periods of time for each pump station:
   a. For start-up and performance testing: Two days - Two trips.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 7 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
2. Shop drawings showing plan, elevation and sectional views, materials of construction, and other pertinent information.

C. Six (6) copies of factory and field test reports.

D. Provide Operation and Maintenance manuals complying with Section 01650.

1.4 PRODUCT DELIVERY

A. Comply with pertinent provisions of Section 01640.

1.5 SPARE PARTS

A. Provide the following minimum spare parts:

1. One of each seal assemblies.
2. One complete set of bearings.
3. One set of wear rings.
4. One of each type relay.
5. One pump starter.
6. One pump alternator.
7. One float switch.
8. One of each type pilot light.
9. One box of each type lamp.

B. Package in one container all spare parts and clearly identify on the outside what the unit is for.

1. Seal tightly and properly protect for long term storage.
2. Deliver to the Engineer for transmittal to the Owner.

1.6 WARRANTY

A. Comply with provisions of Section 01650.

B. The pump manufacturer shall warrant the units being supplied to the Owner against defects in workmanship and material for a period of five (5) years or 10,000 hours under the Municipal Wastewater Permanent Installation Warranty Policy under normal use, operating and service. The warranty shall be in printed form and apply to all similar units.

PART 2. PART 2 - PRODUCTS

2.1 PUMPS

A. General:

1. Provide submersible pumps capable of pumping raw sewage.
2. Provide 4-inch minimum discharge with ANSI 125 lb standard cast iron flange fitting or cast with volute.
3. Provide pump openings and passages adequate to pass 3" diameter sphere and any trash or stringy material which can pass through an average house collection system.
4. Pump components shall be cast iron, ASTM A48, Class 30 and all exposed fasteners and washers shall be Type 304 stainless steel or brass.
5. Pump lift handle to be Type 304 stainless steel.
6. Coat all components, except stainless steel, coming into contact with sewage with a sewage resistant coating. Paint pump exterior with a PVC epoxy primer and a chlorine rubber paint finish.

B. Impeller:

1. Double shrouded non-clog type having a long thrulet without acute turns.
2. Gray cast iron, Class 30, balanced dynamically to 0.5".
3. Paint impeller with one coat of alkyd resin primer.

4. Provide wear ring consisting of a replaceable stationary ring made of brass, drive fitted to the volute inlet.
5. Provide sliding fit between the impeller and the shaft with one key.

C. Volute:

1. Provide single piece, non-concentric design with smooth fluid passages large enough at all points to pass any size solids which can pass through the impeller.

D. Shaft:

1. Provide AISI Type 420 stainless steel.

E. Bearings:

1. The pump shaft shall rotate on two (2) permanently lubricated bearings with a B-10 bearing life of 50,000 hours.
2. The upper bearing shall be single deep groove ball bearing.
3. The lower bearing shall be a two row angular contact ball bearing.

F. Watertight seals:

1. Machine and fit all mating surfaces where watertight sealing is required with nitrile rubber o-rings.
2. Fittings shall be such that sealing is accomplished by metal-to-metal contact between machined surfaces.
3. Do not provide gaskets, elliptical o-rings, grease or other devices.

G. Mechanical seals:

1. Provide each pump with a tandem mechanical shaft seal system.
2. Operate the upper of the tandem set of seals in an oil chamber located just below the stator housing.
3. Provide upper seal set containing one stationary tungsten carbide ring soldered to a holder of stainless steel and one positively driven rotating carbon ring to function as an independent secondary barrier between the pumped liquid and the stator bearings.
4. Provide lower seal set consisting of a stationary ring soldered to a holder of stainless steel and a positively driven rotating ring both of which shall be tungsten carbide.
   a. Hold each interface in contact by its own spring system.
5. Provide lower set of seals to function as the primary barrier between the pumped liquid and the stator housing.
6. The seals shall require neither maintenance nor adjustment, but shall be easily inspected and replaceable.
7. Do not provide shaft seals without positively driven rotating members, or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower units.
8. Provide all seal hardware of stainless steel.

H. Performance:

1. Select each pump to have the necessary characteristics to perform under these operating conditions:

Capacity (gpm)	290
TDH (feet)	118
Efficiency (%)	50
Minimum shut-off head (feet)	
Maximum speed (rpm)	1800

2. Total discharge head (TDH) as listed on drawing or schedule herein does not include losses in the pump from the suction flange to the discharge flange. Therefore, provision shall be made in the design of the pump to accommodate this additional head. These losses shall also be included in the pump efficiencies. The efficiency listed is field efficiency and includes the efficiencies of the bowl corrected for all losses chargeable to the pump, including losses for shafts, column, and discharge head or elbow. Motor efficiency is not included in the field efficiency.

2.2 PUMP MOTOR

A. General:

1. Provide submersible type motor, designed for continuous duty, capable of sustaining a minimum of fifteen (15) starts per hour.
2. Furnish motor and pump as integral unit.
3. Air filled, squirrel cage inducation, shell type design, with Class F insulation system and Class F materials rated for continuous duty in 40°C (104°F) liquids.
4. Furnish motor frame and end shields of cast iron.
5. Provide stainless steel hardware and shaft.
6. Service factor to be 1.15.
7. Provide stator heat-shrink fitted to shaft.
   a. Dip and bake stator in Class F varnish.
   b. Do not use bolts, pins or other fastening devices requiring penetration of the stator housing.
8. Provide rotor bars and short circuit rings of aluminum.

B. Provide a cable entry water seal system to preclude specific torque requirements to insure a watertight and submersible seal.

1. Provide the cable entry of a single cylindrical elastomer grommet, flanked by stainless steel washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the entry body containing a strain relief function, separate from the function of sealing the cable.
2. The assembly shall bear against a shoulder in the pump top.
3. Separate the cable entry junction chamber and motor by a stator lead sealing gland or terminal board to isolate the motor interior from foreign material gaining access through the pump top.
4. Do not use epoxies, silicones, or other secondary sealing systems.

C. Provide prelubricated bearings with minimum B-10 life of 50,000 hours.

D. Thermal protection:

1. Provide motor rated thermally to NEMA MG1-12.42.
2. Protect by means of three (3) thermostatic switches (one in each phase) in the stator windings.

E. Junction chamber:

1. Seal the junction chamber containing the terminal board from the motor by elastomer compression seal (o-ring).
2. Make the connection between the cable conductors and stator leads with threaded compressed type binding, post permanently affixed to a terminal board.

F. Cooling:

1. Provide an adequately designed cooling jacket.
2. Water jacket to encircle the stator housing.
3. Provide jacket with a separate circulation of pumped liquid.

4. Provide non-clogging cooling media channels and supports.
5. Provide provisions for a separate, clear, external motor cooling and lower seal flushing.

G. Motor characteristics shall be:

Minimum Motor HP	25
Speed (rpm)	1800
Operational Current	480 volt, 3 phase

2.3 DISCHARGE CONNECTION

A. Provide a permanently installed discharge connection system that will permit removal and installation of pump without the necessity of an operator entering the wetwell.

B. The pump(s) shall be automatically connected to the discharge connection elbow when lowered into place, and shall be easily removed for inspection or service.

C. Sealing of the pumping unit to the discharge connection elbow shall be accomplished by a simple linear downward motion of the pump.

D. Provide a sliding guide bracket to be an integral part of the pump unit.

E. The entire weight of the pumping unit shall be guided by no less than two guide bars and pressed tightly against the discharge connection elbow with metal-to-metal contact.

F. Do not use a diaphragm, o-ring or other devices to interface sealing of the discharge.

G. Do not bear any portion of the pump directly on the floor of the sump.

2.4 DISCHARGE ELBOW

A. Cast from gray cast iron complying with ASTM A48, Class 30.

B. Provide vertical leg with 6-inch ANSI Class 125 lb. flange.

C. Provide horizontal or inlet leg with a flat machined face for forming an effective seal with the lip seal on pump.

D. Provide elbow with an integral cast iron base for anchoring and support of discharge piping and pump to wetwell floor.

2.5 CHECK VALVES

A. Furnish full flow swing check valves, iron bodied, bronze mounted with external lever and spring.

B. Valve ends to be flanged, ANSI 125 lb. standard.

C. Provide 18-8 stainless steel hinge pin construction and utilize bronze bushings and o-ring seals.

D. Equip valve with removable cover plate allowing for removal of internal components without removing valve from the line.

E. Valves shall be rated 175 psi water working pressure, 350 psi hydrostatic test pressure.

2.6 GUIDE RAILS

A. Provide for each pump two lengths of 1.5", Schedule 40, Type 304 stainless steel pipe as indicated on contract drawings.

B. Provide stainless steel bottom and top pilots, Halliday Metals or equal.

2.7 PUMP GUIDES

A. Attach to pump volute with stainless steel or brass hex head cap screws.

2.8 LIFT CHAIN

A. Provide each pump and motor with adequately sized stainless steel lifting chain.

1. Provide minimum □" welded stainless steel link chain.

B. Length shall reach top of station plus an additional six (6') feet.

C. Provision shall be made for attaching upper end of this chain to the wetwell access frame with Type 316 stainless steel clip and stainless steel eye nut.

D. Connect chain to pump using a Type 316 stainless steel screw pin shackle.

2.9 HARDWARE

A. All bolts, machine screws, nuts, washers, and lockwashers for complete assembly of wetwell access cover, guide rails, and discharge elbow shall be furnished by manufacturer in stainless steel.

2.10 WETWELL ACCESS

A. Fabricate from welded aluminum sections.

B. Provide hinged door of □" aluminum treadplate for each pump. Door shall support 300 psf loading.

C. Upper surface shall be flush, with no protrusions.

D. Fit door with recessed latch requiring a special square tool for access.

E. Provide all hardware of stainless steel.

F. Provide Type 304 stainless steel support bracing with a self-locking hinge mechanism to lock into open position.

G. Provide stainless steel safety chain or nylon coated stainless steel wire rope.

2.11 JIB CRANE

A. Provide a jib crane capable of lifting a load of 1500 pounds safely.

B. Provide necessary bearing equipped pulleys so the winch height is no greater than 4'0".

C. Construct from Type 304 stainless steel.

D. Crane post to be 3" diameter.

1. Construct from Type 304 stainless steel.
2. Pipe schedule to meet load requirements.

E. Provide for 5'6" clearance between the bottom of the winch hook and the top of the wetwell.

F. Provide adjustable boom angle with a minimum of three (3) positions.

G. Provide a static loop on the boom to secure pump chain.

H. Provide for 360° rotation.

I. Provide a manual crank operated winch.

1. Winch frame to be Type 316 stainless steel, one piece design.
2. Stainless steel machine cut spur gears with stainless steel protective covers.
3. Load rating to be 1500 pounds.
4. Provide self-activated braking mechanism.
5. Provide bronze ball bearings.
6. Enclosed gear ratio of 3.8 to 1.
7. Drum capacity of 60 feet of □" diameter cable.
8. Provide 28 feet of □" Type 316 stainless steel cable on drum.
9. Provide a stainless steel safety hook.

J. Minimum design safety factor of 3.0.

K. Provide Halliday Metals or approved equal.

2.12 JIB CRANE SOCKET

A. Provide for installation on each wetwell top two stainless steel raised jib crane sockets for 3" diameter crane post.

1. Bolt to top using stainless steel expansion anchors.

B. Provide Halliday Metals or approved equal.

2.13 LEVEL CONTROL

A. Provide four (4) float switches, single action design, capable of withstanding water penetration under 25' of water with at least a 3 to 1 safety factor.

1. The float switch shall be a 5-1/2" diameter type 316 stainless steel float switch with a mercury switch inside and flexibly supported by a PVC jacketed, heavy-duty cable. Minimum cable length shall be 30 feet.
2. The float switch shall have a 20 amp rating at 115 VAC and 10 amps at 230 VAC. The float shall be type SO with three #14 AWG fine-stranded copper conductors.
3. The floats shall be mounted on a 1/8" type 316 stainless steel vinyl-coated wire rope with 15-pound vinyl-coated cast iron anchor using type 316 stainless steel hardware. They shall be installed in accordance with the manufacturer's recommendations.
4. Float switches shall be U. S. Filter/Consolidated Model 9G Direct Acting Float Switch with CBM cable mounting kit or approved equal. Float switches shall have a 3-year factory warranty.

B. Provide integrally weighted floats:

1. Do not use float switches that require pole mounting.

C. Provide for duplex operation:

1. Utilize "LEAD/LAG" principle using three float switches.
   a. One for "LEAD" pump start.
   b. One for "LAG" pump start.
   c. One for a common "OFF" level.
2. Design circuitry so that operation of the "LAG" pump start circuit is not contingent on proper operation of the "LEAD" pump start circuit.

D. Provide for future triplex operation:

1. Utilize "LEAD/LAG1/LAG2" principle using four float switches.
   a. One for "LEAD/LAG1" pump start. Note: Due to hydraulic conditions, LAG1 and LEAD must run at the same time. Start both pumps from this float, with an appropriate delay between the start of LEAD and LAG1.
   b. One for "LEAD/LAG1" pump start in the event of a failure of the first float.
   c. One for "LAG2" pump start.
   d. One for a common "OFF" level.
2. Design circuitry so that operation of the "LAG1" and "LAG2" pump start circuits are not contingent on proper operation of the "LEAD" pump start circuit.

E. Conduit seals:

1. Provide seals suitable for Class 1, Division 1 and 2, Group D, hazardous locations.

F. Cable holder:

1. Provide 14-gauge stainless steel, ten clamp design, Electric Specialty Model DORS-3.
2. Mount with stainless steel anchors.

2.14 PUMP CONTROL PANEL

A. Enclosure:

1. Provide fiberglass or 14-gauge stainless steel enclosure complying with NEMA 3R, gasketed.
   a. Provide 2'0" high stainless steel support legs with holes for anchoring to floor or concrete pad.
2. Provide a single 3-point locking latch.
   a. Attach with stainless steel screws.
3. Include removable inner swing panel fabricated of aluminum having a minimum thickness of 0.10" mounted on a continuous stainless steel piano type hinge.
   a. Panel shall be of adequate size to completely cover all wiring and components mounted on the back panel and shall make provisions for the mounting of all basic and optional controls and instruments.
   b. Panel shall have a minimum horizontal swing of 90° and shall be held in the closed position with straight slot screws.
4. Provide removable back panel of 0.10" minimum thickness, aluminum, attached to enclosure on collar studs, and of adequate size to accommodate all basic and optional components.
   a. Mount components to back panel securely utilizing screws and lockwashers.
   b. Tap panel to accept mounting screws.
   c. Do not use any self-tapping screws.
5. Back panel to be painted with two coats of white epoxy enamel.
6. Provide engraved nameplates on door mounted hardware.
   a. Attach with stainless steel screws.

B. Motor starters:

1. Provide for each motor a NEMA rated magnetic motor starter as manufactured by Allen Bradley, Square D (Class 8606), or equal.
   a. Equip with undervoltage release and overload protection on all three phases.
   b. Furnish motor starter contacts which can be easily replaced without removing the motor's starter from its mounted position.
   c. Use manual reset overload relays and do not provide means for converting to automatic reset.
2. For motors 15 horsepower or less in size:
   a. Provide open frame, across-the-line, non-reversing type.
3. For motors 20 horsepower and larger in size:
   a. Provide open frame, reduced voltage, non-reversing, auto-transformer, closed transition type.

C. Components:

1. Provide a manual transfer unit to transfer from commercial (normal) power to emergency (generator receptacle) power consisting of two (2) 60 amp, 3 pole, 250V molded case circuit breakers with walking beam mechanical interlock.
   a. Breakers shall be bussed together on load side to feed the motor starter circuit breakers and panel control.
   b. Wire the emergency breaker from the generator receptacle specified elsewhere. Transfer unit shall be interlocked to prevent both commercial and emergency breakers from being closed at the same time, but allow both units to be opened together.
   c. Unit shall carry the service entrance label.
2. Provide power disconnect on each circuit breaker with operator handle located on exterior of inner swing panel.
   a. Include interlock permitting swing panel to be opened only when circuit breakers are in the "OFF" position.
3. Provide "H-O-A" switches for each motor.
   a. Provide UL rated, heavy duty, 600 VAC, NEMA 4X, oil-tight switches, Allen Bradley Series 800H or Square D Class 9001 SK.
   b. "Hand" position not to override motor overload shutdown.
4. Provide the following components with the panel:
   a. Pilot run light for each motor.
   b. Lockable enclosure.
   c. Condensation heater.
   d. Undervoltage, phase failure and phase reversal protection unit, TimeMark Model 265, or Engineer-approved equal.
   e. High level alarm indication light.
   f. Alarm horn silence.
   g. Reset-motor over temperature.
   h. GFI 20A duplex receptacle with stainless steel cover.
   i. Weatherproof switch for flood light.
   j. Control relays.
   k. Remote alarm terminals.
   l. "High temperature" indicator lamps.
   m. "Power on" indicating lamp.
   n. Temperature failure test pushbuttons.
   o. "Seal failure" indicator lamps.
   p. "Seal failure" test pushbuttons.

D. Pump alternator relay:

1. Provide relay of electrical/mechanical industrial design, Class 47, as manufactured by Furnas Electric.
   a. Products of other manufacturers are not acceptable.

2. Include four position selector switch to override automatic alternator and provide manual selection of either Pump No. 1, No. 2, or No. 3 as the "LEAD" pump, Allen Bradley Series 800H or Square D Class 9001SK.

E. High temperature shutdown:

1. Provide high temperature shutdown for each motor utilizing the temperature switches embedded in the motor windings.
   a. Under high temperature conditions switch shall open, de-energizing the motor starter and stopping the pump motor.
   b. High motor temperature shutdown device shall be automatic reset type.

F. Moisture detector control:

1. Provide for each pump a float switch sensor which will detect moisture in the stator chamber.
2. Detection of moisture by the sensor shall disrupt the motor starting circuit of the pump involved.
3. Motor shall remain inoperative until problem is corrected and the control circuit is manually reset.

G. Provide overload reset device operable without opening the inner swing panel.

H. Provide the following components and mount on the back plate:

1. Provide a 115V control circuit transformer (open core and coil type) with primary circuit breaker and secondary circuit breakers for:
   a. Control
   b. Duplex receptacle
   c. Condensation heater
2. Provide an automatic shut-off timer for alarm horn (0-20 min. adjustable).
3. Provide lightning arrestor, Delta Type □LA□.
   a. Do not substitute.
4. Provide power terminals and control terminals.

I. Design control sequence so that panel is functioning automatically again after a power failure and manual reset is not necessary.

1. Provide a time delay relay to prevent both pumps from starting simultaneously after power failure.

J. Provide a terminal board for connection of line, pump leads and level sensors.

K. Provide elapsed time meter wired to each motor starter, six digit, non-resettable, to indicate total running time in hours and tenths.

L. Provide high water alarm activated by micro float switch.

1. Include front panel mounted silence switch.
2. Provide 115V AC, utilizing standard 40 watt incandescent bulb, vapor tight, alarm light with red globe, guard and mounting hardware.
   a. Mount on top of panel.
3. Provide 115V AC, single projector, vibrating type horn with weather-proof housing, including mounting lugs and conduit tap.
4. Horn and light to operate simultaneously under alarm conditions.
5. Horn and light to be on at high level.

M. Pump ammeter:

1. Provide a panel mounted ammeter with a scale range greater than pump rating.
   a. Provide an "Off-L1-L2-L3" selector switch.
   b. Provide a "Pump 1 - Pump 2" selector switch.
2. Provide General Electric or Simpson.

N. Provide a 200 amp, 4 pole, 4 wire, 250V emergency generator receptacle mounted to side of motor control panel and wire to emergency breaker of transfer unit. Receptacle shall be Appleton No. AR20044-200 (verify with Owner to match units already installed in system), 200 amp, 600V, Style 1.

O. Control relays:

1. Provide heavy-duty industrial grade relays, Allen Bradley, Bulletin 700, Type P or Square D, Class 8501, Type X with silver cadmium oxide contacts.

P. Electrical schematic:

1. Provide a laminated electrical schematic diagram of the pump controls including terminal board connections.
2. Permanently mount on the inside of the enclosure door.

Q. All attachment screws are to be stainless steel.

R. Provide a 15 amp, single phase, 125V circuit breaker for power to the flow indicator totalizer.

S. Manufacturer:

1. Switches, pushbuttons and indicator lamps to be Allen Bradley Series 800H or Square D Class 9001 SK.

2.15 WIRING

A. Pump control panel:

1. Unit to be completely factory wired except for power supply, motor, temperature switches and moisture sensor; connections; and, micro float switches.
   a. Comply with applicable standards of National Electric Code.
   b. Color code and number as indicated on factory wiring diagram.
   c. Control wire to be MTW 90□C #14 AWG.
2. Electrically ground all components to a common ground screw mounted on the removable back panel.
3. Neatly group all wiring in plastic wire troughs except wiring from the 14 backplate to the door shall be done in separate bundled harnesses for control circuits.
4. Provide sufficient motor lead wiring and float control wiring to make connections in the junction box to be mounted below the control panel.

B. Level control and motor power cable:

1. Provide cable of adequate length to terminate in control panel junction box without splicing.

PART 3 - EXECUTION

3.1 STRUCTURE

A. Install wetwell (precast utility vault sections) complying with pertinent provisions of Section 03405 and Contract Drawings.

B. Use base plate as a template for drilling individual hole patterns and mount base plates using □" Type 316 stainless steel expansion anchors.

C. Set up 60° slope on both sides of wetwell as indicated on Contract Drawings, using portland cement grout.

D. Locate jib crane socket from shop drawings and cast into concrete wetwell top.

E. Assemble the guide rails to access frame and plumb the assembly.

F. Install float switch support to precast top using Type 316 stainless steel anchors.

G. Install pumps and piping, plumbing assembly for proper alignment and fit.

H. Seal around inlet and discharge piping as indicated on Contract Drawings.

I. Install power cables using the cable strain reliefs and cord grips.

3.2 JIB CRANE TEST

A. Demonstrate jib crane capabilities and safety by lifting a load of 1500 pounds from the bottom of the wetwell.

3.3 FIELD WIRING

A. Comply with pertinent provisions of Section 16400.

B. Extend grounding wire from control panel main ground screw to external ground as indicated and complying with NEC and local electrical codes.

C. Mount and connect alarm light and horn if provided for remote mounting.

D. Make motor lead, micro float switch, temperature sensor, moisture sensor, and power supply connections.

E. Seal all conduits between junction box and control panel in accordance with the plans and complying with all pertinent National Electric Code requirements.

F. Seal conduit terminations in control panel with duct seal.

G. Use licensed personnel.

3.4 PUMP TESTING

A. Provide the following inspections and tests on each pump before shipment from factory by the manufacturer:

1. Check impeller, motor rating and electrical connections for compliance to the customer's purchase order.
2. Make a motor and cable insulation test for moisture content or insulation defects.
3. Prior to submergence, the pump shall be run dry to establish correct rotation and mechanical integrity.
4. Run the pump for 30 minutes submerged, a minimum of six (6') feet under water.
5. After operational test No. 4, perform the insulation test (No. 2) again.
6. Supply a written report stating the foregoing steps have been done with each pump at the time of shipment.

B. Provide the following tests after installation:

1. In presence of Engineer, remove pump from structure and replace, demonstrating proper alignment and operation of mating parts.
2. Operate pumps utilizing manual and automatic modes, demonstrating proper operational sequences including alarm conditions.
3. Measure amperage, voltage, pumping rate and discharge pressure for each pump operating separately and for both pumps operating simultaneously.
4. Submit six (6) copies of final test report for approval.

3.5 MEASUREMENT AND PAYMENT

A. No separate measurement or direct payment will be made for this work and all costs for same shall be included in the price bid for the work to which it pertains.

END OF SECTION

Exhibit B 5

Wastewater Construction Permit
Bureau of Water

D H E C
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

PROJECT NAME: **ACADIA PUMP STATION PH 1**	COUNTY: **GREENVILLE**
LOCATION: BETWEEN BEECH BLUFF WAY, SC HWY 20, I-85 & SALUDA RIVER	

PERMISSION IS HEREBY GRANTED TO: ACADIA DEVELOPMENT CO LLC
148 RIVER ST STE 150
GREENVILLE SC 29601

for the construction of a sanitary sewer system in accordance with the construction plans, specifications, design calculations and the Construction Permit Application signed by Joe Barron, Registered Professional Engineer, S.C. Registration Number: 7671.

PROJECT DESCRIPTION: A Triplex submersible pump station with 8300 LF of parallel 6" and 8" force mains to serve future development.

TREATMENT FACILITY: This project will connect to WCRSA/GEORGES CREEK (NPDES permit SC0047309) but will not contribute any new flow.

STANDARD CONDITION:

In accepting this permit, the owner agrees to the admission of properly authorized persons at all reasonable hours for the purpose of sampling and inspection. This is a permit for construction only and does not constitute DHEC approval, temporary or otherwise, to place the system in operation. An Approval to Place in Operation is required and can be obtained following the completion of construction by contacting the GREENVILLE EQC OFFICE at 864-241-1090. Additional permits may be required prior to construction (e.g., Stormwater).

SPECIAL CONDITIONS:

1. All construction/materials for this project must conform to the Standard Specifications for FLETCHER GROUP INC.
2. Design and construction of force mains shall be such that they satisfy a leakage test in accordance with AWWA C-600 (DIP) or AWWA C-605 (PVC).

PERMIT NUMBER:	**32494-WW**
ISSUANCE DATE:	**May 12, 2006**
EXPIRATION DATES:	**May 11, 2008** (to begin construction) **May 12, 2009** (to obtain Approval to Place in Operation)

John T. Litton, P.E., Director
Stormwater, Construction and Agricultural Permitting Division

JA

WW-1360-15

D H E C
PROMOTE PROTECT PROSPER

Construction Permit Application
Water/Wastewater Facilities

BUREAU OF WATER

DRP SUBMITTAL: No ☐ Yes ☐

SELECT ONE ➧ ☐ Water Facilities ☒ Wastewater Facilities ☐ Water & Wastewater Facilities

I. **Project Name:** Acadia Pump Station ph 1 **County:** Greenville

II. **Project Location** (street names, etc.):

New residential development located between Beech Bluff Way, SC Hwy. 20, I-185 (Southern Connector) and Saluda River

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III. **Project Description(s):** *Water System:*

Wastewater System:

Triplex submersible pump station with 8300 feet of parallel 6" and 8" force mains

Project Type (A-Z): Water: ☐ Wastewater: C Pump Station and/or Force Main

IV. ***Initial* Owner:** [Time of Application] Name/Organization: Caleb Freeman/Acadia Development Co., LLC
Address: 148 River St., Suite 150 City: Greenville State: South Carolina Zip: 29601 Phone: (864) 331-6300

V. ***Final* Owner:** [After Construction] Name/Organization: Sam Weaver/Condor Environmental
Address: 508 Poinsett Hwy. City: Greenville State: South Carolina Zip: 29609 Phone: (864) 242-6644

VI. **Entity Responsible for Final Operation & Maintenance of System:**
Water System: Name: _____ Address: _____
City: _____ State: _____ Zip: _____ Phone: _____ Fax: _____
Wastewater System: Name: Condor Environmental Address: 508 Poinsett Hwy.
City: Greenville State: South Carolina Zip: 29609 Phone: (864) 242-6644 Fax: _____

VII. **Engineering Firm:** Name: Fletcher Group, Inc. Address: 148 River St., Suite 220
City: Greenville State: South Carolina Zip: 29601 Phone: (864) 421-9999 Fax: (864) 421-9909

VIII. **Is this project:** A) Part of a phased project? No☐ Yes☒. If Yes, Phase 1 of 4
B) A revision to a previously permitted project? No☒ Yes☐. If Yes, Permit # _____
Date Approved: _____ *(MM/DD/YYYY)* Project name (if different): _____
C) Submitted based on a Schedule of Compliance or Order issued by DHEC? No☒ Yes☐. Order # _____
D) Anticipating funding by the State Revolving Fund (SRF)? No☒ Yes☐.
E) Crossing a water body? (e.g., river, creek) No☐ Yes☒. If Yes, Name of water body Unnamed tributaries

IX. **Are Standard Specifications approved by DHEC being used on this project?** No☒ Yes☐. If Yes:
Water: Date Approved: _____ *(MM/DD/YYYY)* Approved for whom: _____
Wastewater: Date Approved: _____ *(MM/DD/YYYY)* Approved for whom: _____

X. **Wastewater Systems:** A) Type: Domestic ☒ Process *(Industrial)* ☐ Combined *(Domestic & Process)* ☐
B) Total average design flow of the project not to exceed 51,250 GPD
C) *Sewers or Pretreatment*
Treatment Systems
1. Name of facility (e.g., POTW) treating the wastewater: WCRSA/George's Creek
2. NPDES/ND Number of facility in Item #1: SC0047309
3. Date Preliminary Engineering Report (PER) approved: _____ *(MM/DD/YYYY)*
4. NPDES/ND application submitted? No☐ Yes☐. If Yes, Date: _____ *(MM/DD/YYYY)*
Disposal Sites
5. Effluent Disposal Site (Description): _____
6. Sludge Disposal Site (Description): _____

XI. **Water Systems:** Project located within city limits? No☐ Yes☐.
Public water system providing water (Name & System ID No.): _____ No.: _____
New water system (including master meter)? No☐ Yes☐. If Yes, System name: _____

XII. **Type of Submittal:** Complete **Section A (Standard)** *or* **Section B (Delegated Review Program - DRP).**

A) Standard Submittal *must* include the following, where applicable:

- ☒ 1. A **transmittal** letter outlining the submittal package.
- ☒ 2. The **original** construction permit application, properly completed, with three (3) copies.
- ☒ 3. Three (3) sets of signed and sealed plans and specifications. Specifications may be omitted if approved standard specifications are on file with DHEC.
- ☒ 4. One (1) additional overall plan sheet showing the proposed and existing (only in the area of proposed construction) water and wastewater lines (highlighted for identification) and their sizes.
- ☒ 5. Three (3) sets of the appropriate design calculations. WASTEWATER: Design flow (based on R.61-67, Appendix A), pump station calc's. and pump curve. WATER: Recent flow test from a location near the tie-on site, design calc's. indicating pressure maintained in the distribution system during max. instantaneous demand, fire flow and flushing velocities achieved. Number/types of service connections, well record form, pumping test results, etc.
- ☒ 6. Three (3) copies of a detailed 8½" x 11" location map, separate from the plans.
- ☐ 7. Three (3) copies of construction easements unless the project owner has the right of eminent domain.
- ☒ 8. A letter(s) from the entity supplying water and/or providing wastewater treatment stating their willingness and ability to serve the project, including pretreatment permits, if applicable. The letter should include the specific flow and, when applicable, the specific number of lots being served.
- ☒ 9. A letter(s) from the entity agreeing to be responsible for the O&M of the water and/or wastewater system.
- ☒ 10. Application fee enclosed $ 350.00 . (Refer to Instructions).
- ☒ 11. WATER SYSTEMS: a) A letter from the local government which has potable water planning authority over the area, if applicable, in which the project is located, stating project consistency with water supply service plan for area.
  b) For wells, four (4) copies of a wellhead protection area inventory.
  c) For new wells, a viability demonstration is required in accordance with Regulation 61-58.1.B.(4).

Note: Other approvals may include 208 and OCRM certification, and navigable waterway permitting.

B) DRP submittal (treatment plants are not covered) *must* include the following, where applicable:

- ☐ 1. A **transmittal** letter, signed by the professional engineer representing the DRP entity, noting this is a DRP submittal. The letter should state that the project has been reviewed and complies with R.61-58 and/or R.61-67.
- ☐ 2. The **original** construction permit application, properly completed, with two (2) copies.
- ☐ 3. Two (2) sets of the signed and sealed plans.
- ☐ 4. One (1) additional plan sheet with water and wastewater lines highlighted, as required under Sec. XII.A.4. above.
- ☐ 5. Two (2) sets of the appropriate design calculations. WASTEWATER: Same information as required under Section XII.A.5. above. WATER: Same information as required under Section XII.A.5. above.
- ☐ 6. Two (2) copies of a detailed 8½" x 11" location map, separate from the plans.
- ☐ 7. Two (2) copies of construction easements, unless the project owner has the right of eminent domain.
- ☐ 8. DHEC's Ocean and Coastal Resource Management certification (for projects in applicable counties).
- ☐ 9. DHEC's Water Quality permit or conditions for placement in navigable waters, and other Agency approvals.
- ☐ 10. WASTEWATER SYSTEMS: a) A letter of acceptance from the entity providing the treatment of the wastewater that includes the specific flow and, when applicable, the specific number of lots being accepted.
  b) A letter from the organization agreeing to be responsible for the O&M of the sewer system.
  c) The 208 Plan certification from the appropriate Council of Governments (designated 208 areas), or from DHEC on the non-designated 208 areas.
- ☐ 11. WATER SYSTEMS: A letter from the local government which has potable water planning authority over the area, if applicable, in which the project is located, stating project consistency with water supply service plan for area.
- ☐ 12. Fee of $75 for water and $75 for sewer ($150 if combined).

Note: The DRP entity should ensure that a copy of the final approved plans are returned to the design engineer.

XIII. Construction plans, material and construction specifications, the engineering report including supporting design data and calculations are herewith submitted and made a part of this application. I have placed my signature and seal on the engineering documents submitted, signifying that I accept responsibility for the design of this system, and that I have submitted a complete administrative package.

Engineer's Name (Printed): JOE M. BARRON Signature: _____

S.C. Registration Number: 7671 Registered Professional Engineer

XIV. Prior to final approval, I will submit a statement certifying that construction is complete and in accordance with the approved plans and specifications, to the best of my knowledge, information and belief. This certification will be based upon periodic observations of construction and a final inspection for design compliance by me or a representative of this office who is under my supervision.

Engineer's Name (Printed): JOE M. BARRON Signature: _____

S.C. Registration Number: 7671 Registered Professional Engineer

XV. I hereby make application for a permit to construct the project as described above. I have read this application and agree to the requirements and conditions and agree to the admission of properly authorized persons at all reasonable hours for the purpose of sampling and inspection.

Owner's Name (Printed): CALEB C. FREEMAN Signature: _____

Owner's Title: PRESIDENT, ACADIA, LLC Date: 1-30-06 *(MM/DD/YYYY)*